

FINAL

**ENVIRONMENTAL ASSESSMENT
T-10 HUSH HOUSE**

TINKER AIR FORCE BASE, OKLAHOMA



**United States Air Force
Air Force Materiel Command**

Tinker Air Force Base, Oklahoma

July 2008

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**FINDING OF NO SIGNIFICANT IMPACT
REACTIVATION OF T-10 HUSH HOUSE
TINKER AIR FORCE BASE**

Pursuant to Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA; 40 Code of Federal Regulations [CFR] 1500 1508), Department of Defense (DoD) Directive 6050.1, and Air Force Regulation 32 CFR Part 989, Tinker AFB has prepared an Environmental Assessment (EA) that evaluates the potential environmental and socioeconomic impacts associated with the reactivation of a T-10 Hush House to accommodate an increase in engine testing at Tinker Air Force Base (AFB). This EA is incorporated by reference into this finding.

DESCRIPTION OF PROPOSED ACTION: The Proposed Action comprises reactivation of an existing hush house (Building 926, comprising approximately 13,000 square feet) for engine testing. The Proposed Action would include renovation of Building 926 and its associated systems. The Proposed Action also includes the addition and overall basewide increase of engine testing operations at Tinker AFB. The projected total number of engines to be tested annually in the T-10 hush house facility would be approximately 413. However, this estimate may fluctuate and would be determined by the number of engines received from the field for repair. (EA Section 2.2)

IDENTIFIED ALTERNATIVES

Alternatives to the Proposed Action have been considered and two were identified to be carried forward for further analysis, including the No-Action Alternative.

DESCRIPTION OF ALTERNATIVE 1: Implementation of Alternative 1 would involve refurbishment of Buildings 3703 and 3234 to accommodate the increase in engine testing workload at Tinker AFB. Buildings 3703 and 3234 are currently used for engine testing; however, neither Building 3703 nor 3234 can currently accommodate the F100-229 engine. This alternative was not selected as the Proposed Action location because the facilities could not be modified to accommodate testing of the F100-229 engine within the required timeline to accommodate proposed engine testing workload. Additionally, this alternative would require the greatest disruption of base operations and commitment of financial resources. (EA Section 2.3.1)

DESCRIPTION OF THE NO-ACTION ALTERNATIVE: Under the No-Action Alternative, Tinker AFB would not implement the Proposed Action. Under the No-Action Alternative, the midfield T-10 Hush House would remain unoccupied/unused, engine testing would continue as is currently performed in Buildings 3703 and 3234, testing of the F100-229 engine could not occur at the base, and the Oklahoma City Air Logistics Center (OC-ALC) could not increase either its capacity or tempo of testing engines to meet future requirements.

Although this alternative would not fulfill the purpose or need of the Proposed Action, this alternative is carried forward as required by the CEQ. (EA Section 2.3.2)

SUMMARY OF FINDINGS FOR PROPOSED ACTION

Physical and Human Environment: The Proposed Action would result in no or minimal impacts to land use, geological resources, visual resources, cultural resources, socioeconomics, environmental justice, or protection of children.

Air Quality: Combustion emissions associated with refurbishment-related vehicles and equipment would be minimal because most vehicles would be driven to and kept at the proposed project site for the duration of refurbishment activities. Operational emissions are expected to increase with implementation of the Proposed Action. All estimated pollutant emissions were below both primary and secondary National Ambient Air Quality Standards (NAAQS); therefore, no impact to human health or the environment is anticipated. (EA Section 4.1)

Noise and Vibration: No sensitive receptors would experience an increase in sound levels, although on-base receptors would experience a negligible increase. With the implementation of military safety measures, noise impacts to individuals conducting tests would be negligible. Vibrations from engine testing are expected to be of short duration and frequency. Noise generated from refurbishment activity would be similar to existing ambient noise levels at Tinker AFB. (EA Section 4.2)

Water Resources: A mobile fuel tank trailer would be stored outside Building 926; any required updates to the on-site secondary containment would be completed prior to installation of the fuel tank. The proponent organization would obtain permission for the temporary restroom facility and would be responsible for submitting information on the location and use of the facility as well as best management practices to ensure that storm water is protected and Tinker AFB complies with National Pollutant Discharge Elimination System regulations. Implementation of the Proposed Action would not modify or impact any existing wetlands or floodplains, and no other impacts to water resources are anticipated. (EA Section 4.3)

Biological Resources: The Proposed Action would occur in an area already disturbed by noise and heavy activity associated with flight and airfield operations. No threatened or endangered species are expected to occur in this area. Vibration associated with the hush house may disturb ground-dwelling animals. Implementation of the Proposed Action would negligibly affect the wildlife species that may utilize the site. (EA Section 4.4)

Transportation and Circulation: Implementation of the Proposed Action would require delivery of materials during refurbishment activities. Increases in traffic volumes associated with these activities would be short-term. During operation, crews would arrive together in a single vehicle, to be left onsite during shifts; therefore, no new parking facilities would be required.

Implementation of the Proposed Action would require fuel trucks, personnel, and engine traffic to cross the taxi-way. However, all traffic would use a proposed route that would result in negligible operation-related impacts. (EA Section 4.5)

Hazardous Materials and Wastes: Implementation of the Proposed Action would result in an increase in the amount of fuel and lubrication oil used at Tinker AFB but would result in only a slight increase in the volume of hazardous wastes generated over time. Only negligible impacts involving hazardous materials and wastes would occur as a result of the Proposed Action. (EA Section 4.6)


Safety: Implementation of the Proposed Action would not result in any activities occurring within or modifying established airfield Clear Zones or Accident Potential Zones. Implementation of the Proposed Action would require fuel trucks, personnel, and engine traffic to cross the airfield taxi-way. However, all traffic would use an approved designated route and all drivers would be flight-line trained to ensure that no impacts to airfield safety would result from implementation of the Proposed Action. (EA Section 4.7)

CUMULATIVE IMPACTS: The cumulative impacts of implementing the proposed action along with other past, present, and future projects were assessed in the EA, and no significant impacts were identified. (EA Section 5)

PERMITS: Implementation of the Proposed Action would not require modification of Tinker AFB's current permits.

PUBLIC COMMENTS: A Notice of Availability for public review of the Draft EA was published in the Oklahoman on June 20, 2008. The Draft EA was available for public review at the Midwest City Public Library. The public review period lasted 21 days, and no public comments were received; therefore, no such comments were incorporated as part of the Final EA.

DECISION: The Proposed Action is to reactivate an existing hush house (Building 926, comprising approximately 13,000 square feet) for engine testing. Based upon my review of the facts and analyses contained in the EA, which is hereby incorporated by reference, I conclude that the Proposed Action will not have a significant impact on the natural or human environment. An environmental impact statement is not required for this action. This analysis fulfills the requirements of the NEPA, the President's Council on Environmental Quality, and 32 CFR Part 989.



ALLEN J. JAMERSON, Colonel, USAF
Commander, 72nd Air Base Wing

Date 28 Aug 2008

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ALLEN J. JAMERSON, Colonel, USAF
Commander, 72nd Air Base Wing

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APPENDICES

Appendix A	Oklahoma Corporation Commission and Oklahoma Department of Environmental Quality Letters
Appendix B	Public Notice

LIST OF ACRONYMS

3 CCG	3rd Combat Communications Group
38 EIG	38th Engineering Installation Group
72 ABW	72nd Air Base Wing
76 MXW	76th Maintenance Wing
ACOG	Association of Central Oklahoma Government
AERMOD AMS/EPA	Regulatory Model
AFB	Air Force Base
AFI	Air Force Instruction
AFH	Air Force Handbook
AFLC	Air Force Logistics Command
AFMC	Air Force Materiel Command
AGE	Aerospace Ground Equipment
AGL	Above Ground Level
AICUZ	Air Installation Compatible Use Zone
ANSI	American National Standards Institute
APs	Accumulation Points
APZs	Accident Potential Zones
ASTs	Aboveground Storage Tanks
AWAC	Airborne Warning and Control
BACT	Best Available Control Technology
BASH	Bird/Wildlife-Aircraft Strike Hazard
bgs	Below ground surface
BMP	Best Management Practice
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMS	Corrective Measure Studies
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CPs	Collection Points
CWA	Clean Water Act
CZs	Clear Zones
dB	Decibels
dBA	A-weighted Decibel Measurements
°F	Degrees Fahrenheit
DEQ	Oklahoma Department of Environmental Quality
DLA	Defense Logistics Agency
DoD	US Department of Defense
DMRT	Depot Maintenance and Reengineering Transformation
DRMO	Defense Reutilization and Marketing Office
EA	Environmental Assessment
EAC	Early Action Compaction
ECAMP	Environmental Compliance Assessment and Management Program

LIST OF ACRONYMS (Cont.)

EIAP	Environmental Impact Analysis Process
EIG	Engineering Installation Group
EIS	Environmental Impact Statement
EO	Executive Order
EPA	US Environmental Protection Agency
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FICON	Federal Interagency Committee on Noise
FONSI	Finding of No Significant Impact
Ft	feet
FY	Fiscal Year
GM	General Motors
GWTP	Ground Water Treatment Plant
HAP	Hazardous Air Pollutant
HMMP	Hazardous Materials Management Program
HMMS	Hazardous Materials Management System
HUD	US Department of Housing and Urban Development
Hz	hertz
I-	Interstate
IAP	Initial Accumulation Point
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IRP	Installation Restoration Program
IWTP	Industrial Wastewater Treatment Plant
L _{dn}	Day-night Average Sound Level
LLSZ	Lower-Lower Saturated Zone
LQG	Large Quantity Generator
LSZ	Lower Saturated Zone
LUC	Land Use Control
MLRA	Major Land Resource Areas
MSDS	Material Safety Data Sheet
MSGP	Multi-Sector General Permit
MS4	Municipal Separate Storm Sewer System
NAAQS	National Ambient Air Quality Standards
NEI	National Emission Inventory
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NO _x	Nitrogen Oxides
NO ₂	Nitrogen Dioxide
NPL	National Priorities List
NWI	National Wetland Inventory
O ₃	Ozone
OAC	Oklahoma Administrative Code
OC-ALC	Oklahoma City Air Logistics Center

LIST OF ACRONYMS (Cont.)

OCC	Oklahoma Corporation Commission
ODWC	Oklahoma Department of Wildlife Conservation
ONHI	Oklahoma Natural Heritage Inventory
ORBCA	Oklahoma Risk-Based Corrective Action
OU	University of Oklahoma
OWRB	Oklahoma Water Resources Board
PA	Preliminary Assessment
Pb	Lead
PDM	Programmed Depot Maintenance
PM _{2.5}	Particulate matter equal to or less than 2.5 microns in diameter
PM ₁₀	Particulate matter equal to or less than 10 microns in diameter
POLs	Petroleum, Oils, and Lubricants
POVs	Privately Owned Vehicles
ppm	Parts Per Million
PPV	Peak Particle Velocity
PSD	Prevention of Significant Deterioration
PZ	Production Zone
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigations
RI/FS	Remedial Investigations/Feasibility Studies
SF	Square Feet
SIP	State Implementation Plan
SO ₂	Sulfur Dioxide
SO _x	Sulfur Oxides
STP	Sanitary Treatment Plant
SWPP	Stormwater Pollution Prevention Plan
TAFBI	Tinker Air Force Base Instruction
TAC	Tinker Aerospace Complex
TPW	Texas Parks and Wildlife
tpy	Tons per year
TSDF	Treatment, Storage, and Disposal Facility
µg/m ³	micrograms per cubed meter
US	United States
USACE	US Army Corps of Engineers
USAF	US Air Force
USC	US Code
USDA	US Department of Agriculture
USDOT	US Department of Transportation
USFWS	US Fish and Wildlife Service
UST	Underground Storage Tank
USZ	Upper Saturated Zone
VFR	Visual Flight Rules
VOCs	Volatile Organic Compounds
WSA	Waste Staging Areas

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SECTION 1 OVERVIEW

1.1 Introduction

The United States Air Force (USAF) proposes to increase the number of engines tested at the Oklahoma City Air Logistics Center (OC-ALC) to meet mission requirements. The Air Force 37/T-10 Hush House located between the two operational runways at Tinker Air Force Base (AFB), Oklahoma (Building 926) has been proposed for reactivation to accommodate the increase in engine testing.

This Environmental Assessment (EA) addresses the potential impacts of the Proposed Action on the human and natural environment as required by the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] §§ 4321-4347), and in accordance with the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508) and Air Force Instruction (AFI) 32-7061 entitled Environmental Impact Analysis Process (EIAP) (32 CFR Part 989).

1.2 Purpose and Need

The *purpose* of the Proposed Action is to accommodate an increase in the number and types of engine testing at Tinker AFB. Ground runups (i.e., engine testing) of aircraft and aircraft engines are a major source of noise at most bases. This noise may interfere with other base activities, degrade the environment of off-base communities, and cause hearing damage of Air Force personnel. The existing but decommissioned T-10 hush house located in the airfield environment is capable of accommodating the increased testing while maintaining the health and safety of Tinker AFB personnel.

The *need* for the Proposed Action is that the new workload for engine testing proposed at Tinker AFB will exceed the capacity and capability of the current operating test cells in Buildings 3703 and 3234, where engine testing is currently conducted. Furthermore, there are currently no facilities at Tinker AFB capable of testing particular engines (e.g., F-100-229). A T-10 hush house has the capacity to enable testing of engines installed in aircraft as well as engines that have been removed from aircraft.

Hush houses are hangar-like structures designed to isolate aircraft engine noise associated with diagnostic engine tests from the surrounding environment. Two types of hush houses are operational in the United States (US): the T-10 and the T-9. The T-10 hush house can accommodate either an uninstalled engine mounted on a stand or an engine installed in an aircraft. The T-9 hush house can accommodate only uninstalled engines. Due to the size of the aircraft stationed at Tinker AFB, the T-10 hush house would only be used for uninstalled engines. The sidewalls of the T-10 structure, which is proposed for this action, are composed of acoustic baffles designed to allow airflow into the building and attenuate sound leaving the

building. Air enters the interior of the building through five air inlet doors on each interior sidewall. That air enters the control and equipment rooms through four forward doors and is then drawn into the engine air inlet. Air then passes through six rear sidewall inlet doors is entrained by the flow of engine exhaust gas as it enters the augments tube. This air can mix with the exhaust gas to reduce its temperature as it leaves through the augments tube.

The noise suppressor for the T-10 hush house consists of prefabricated assemblies that are transported by truck or rail car to the job site and are assembled there on a prepared foundation to form the complete facility. The T-10 noise suppressor provides a means of testing jet and turbo fan engines within controlled conditions that reduce the environmental noise levels of an engine test run.

The purpose of testing engines is to confirm proper operation and condition of the engine prior to being installed into a waiting aircraft or shipped to another location where the engine will be installed.

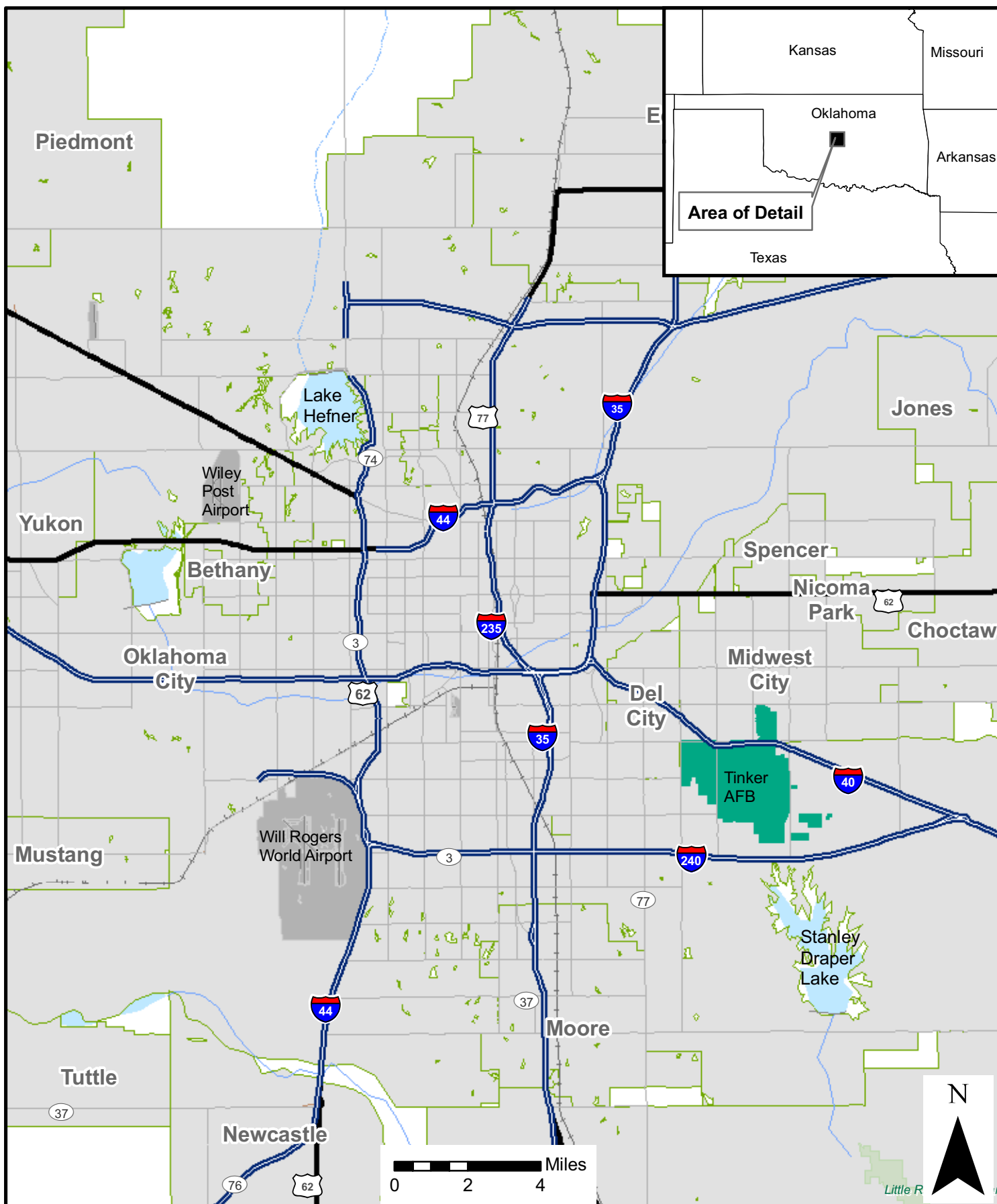
1.3 Location, History and Current Mission

1.3.1 Tinker AFB

Tinker AFB is located within the city limits of Oklahoma City, 5 miles east of downtown (Figure 1-1). The main portion of the base is bordered to the north by Interstate 40 (I-40) and 29th Street, to the east by Douglas Boulevard, to the south by 74th Street, and to the west by Sooner Road. Midwest City and Del City are located north and northwest of Tinker AFB, respectively.

Tinker AFB's history began in 1940 when a group of Oklahoma City civic leaders and businessmen learned that the War Department was considering the central US as a location for a maintenance and supply depot. On 8 April 1941, the order was officially signed awarding the depot to Oklahoma City. Oklahoma Air Depot was renamed "Tinker AFB" in honor of Major General Clarence L. Tinker of Pawhuska, Oklahoma. General Tinker lost his life while leading a strike against Japanese forces on Wake Island during the early months of World War II.

Since its establishment, Tinker AFB has expanded its real property assets to include more than 5,000 acres. In the 1960s, 1970s, and 1980s, the base acquired maintenance responsibilities for additional aircraft, engines, and equipment; the additional associate organizations and responsibilities resulted in an increase in both civilian and military personnel. In the 1970s, the base took over management of new weapons including the A-7D Corsair, the E-3A Airborne Warning and Control (AWAC) aircraft, the E-4 Airborne Command Post aircraft, and air- and ground-launched missiles.



EA

**Regional Location
T-10 Hush House
Tinker Air Force Base**

Page 1-3
July 2008

FIGURE

1-1

Tinker AFB's largest organization is the OC-ALC. The OC-ALC is the largest of three Air Logistic Centers in the Air Force Materiel Command (AFMC) and provides depot maintenance, product support, services and supply chain management, as well as information support for 31 weapon systems, 10 commands, 93 Air Force bases, and 46 foreign nations. The OC-ALC is the worldwide manager for a wide range of aircraft, engines, missiles, software, and avionics and accessories components.

Currently, Tinker AFB contains more than 700 buildings (comprising approximately 16 million square feet), an airfield, and other facilities that support various associate units at the base (Figure 1-2). Tinker AFB provides specialized logistics support, management, maintenance, and distribution to defense weapons systems worldwide. Tinker AFB is divided into seven districts, each with specific land uses. The 72nd Air Base Wing (72 ABW) is the host command. Associate units located at the base include the OC-ALC, the 552nd Air Control Wing, the 507th Air Refueling Wing, the US Navy Command Strategic Communications Wing One, the 3rd Combat Communications Group (3 CCG), and the 38th Engineering Installation Group (38 EIG).

1.4 Summary of Environmental Study Requirements

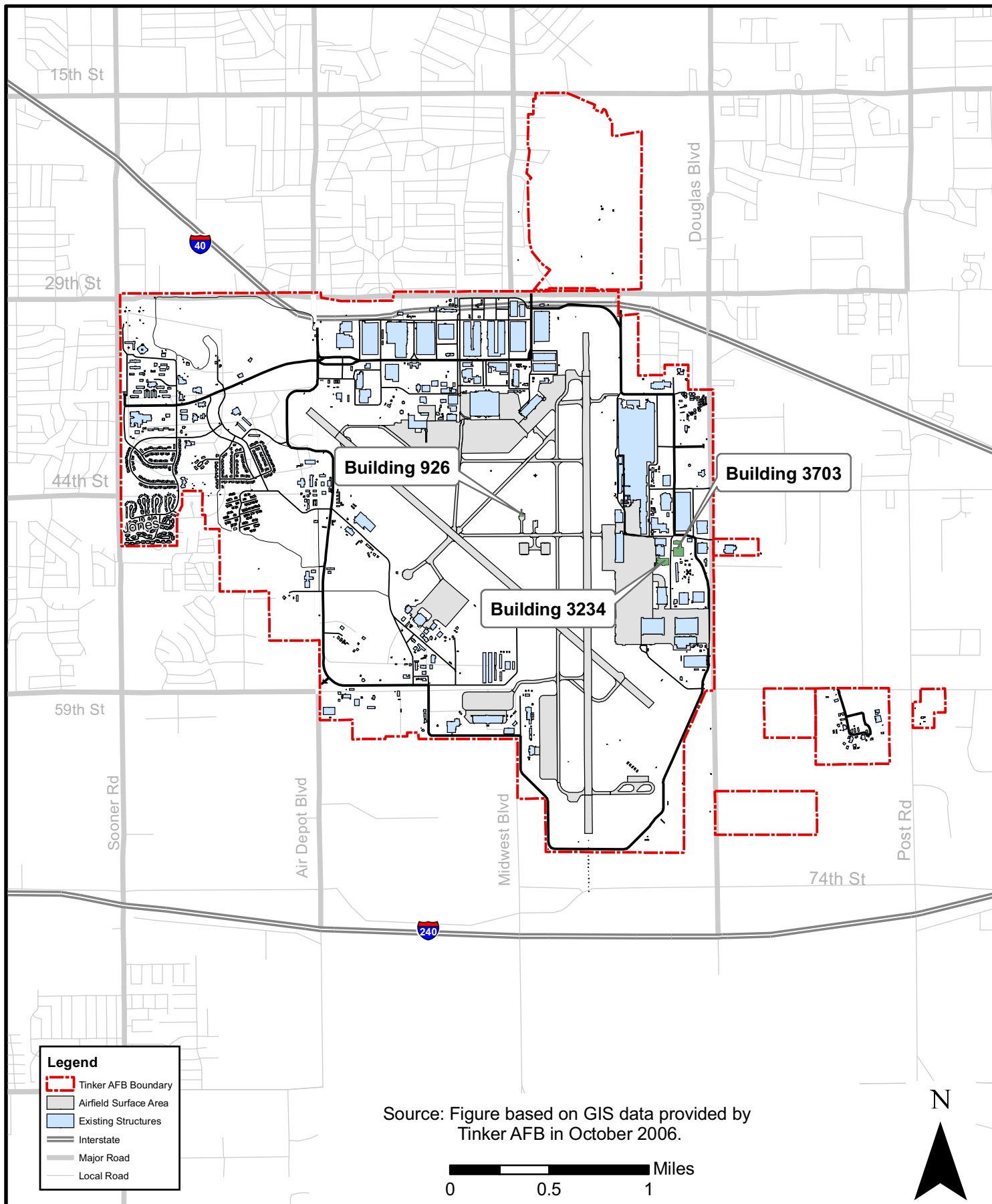
The EIAP is the process by which Federal agencies facilitate compliance with environmental regulations. NEPA is the primary legislation affecting these agencies' decision-making process. This act and other facets of the EIAP are described below.

1.4.1 National Environmental Policy Act

NEPA requires that Federal agencies consider potential environmental consequences of proposed actions. The law's intent is to protect, restore, or enhance the environment through well-informed Federal decisions. The CEQ was established under NEPA for the purpose of implementing and overseeing Federal policies as they relate to this process. In 1978, the CEQ issued Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR §§1500-1508 [CEQ 1978]). The USAF developed its own procedural regulations for implementing NEPA entitled EIAP (AFI 32-7061, codified at 32 CFR Part 989). These regulations specify that an EA be prepared to:

- briefly provide sufficient analysis and evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI);
- aid in an agency's compliance with NEPA when no EIS is necessary; and facilitate preparation of an EIS when one is necessary.

Further, to comply with other relevant environmental requirements (e.g., the Safe Drinking Water Act, Endangered Species Act [ESA], and National Historic Preservation Act [NHPA]), and to assess potential environmental impacts, the EIAP and decision-making process for the proposed action involves a thorough examination of all environmental issues pertinent to the action. The decision-making process includes a study of environmental issues related to the proposed construction and operations changes at Tinker AFB.



1.4.2 Interagency and Intergovernmental Coordination for Environmental Planning

Public involvement is a useful component of the EA process; it includes both agencies and members of the public. Public involvement occurs primarily during the public comment period.

Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) is a federally mandated process for informing and coordinating with other governmental agencies regarding proposed actions. As detailed in 40 CFR § 1501.4(b), CEQ regulations require intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the IICEP process, the USAF notifies relevant federal, state, and local agencies and allows them sufficient time to make known their environmental concerns specific to a proposed action. Comments and concerns submitted by these agencies during the IICEP process are subsequently incorporated into the analysis of potential environmental impacts conducted as part of the EA.

The draft EA was sent directly to the Oklahoma Department of Environmental Quality (DEQ) and the Oklahoma Corporation Commission (OCC). The DEQ and OCC letters are included in Appendix A. A notice of availability was published in the *Oklahoman* and *Tinker Take Off* (Appendix B). The draft EA was located at the Midwest City Library. During the 21-day public comment period, all interested individuals were given the opportunity to request to view a copy of the draft EA at the selected library and submit written comments. No public or agency comments were received.

SECTION 2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

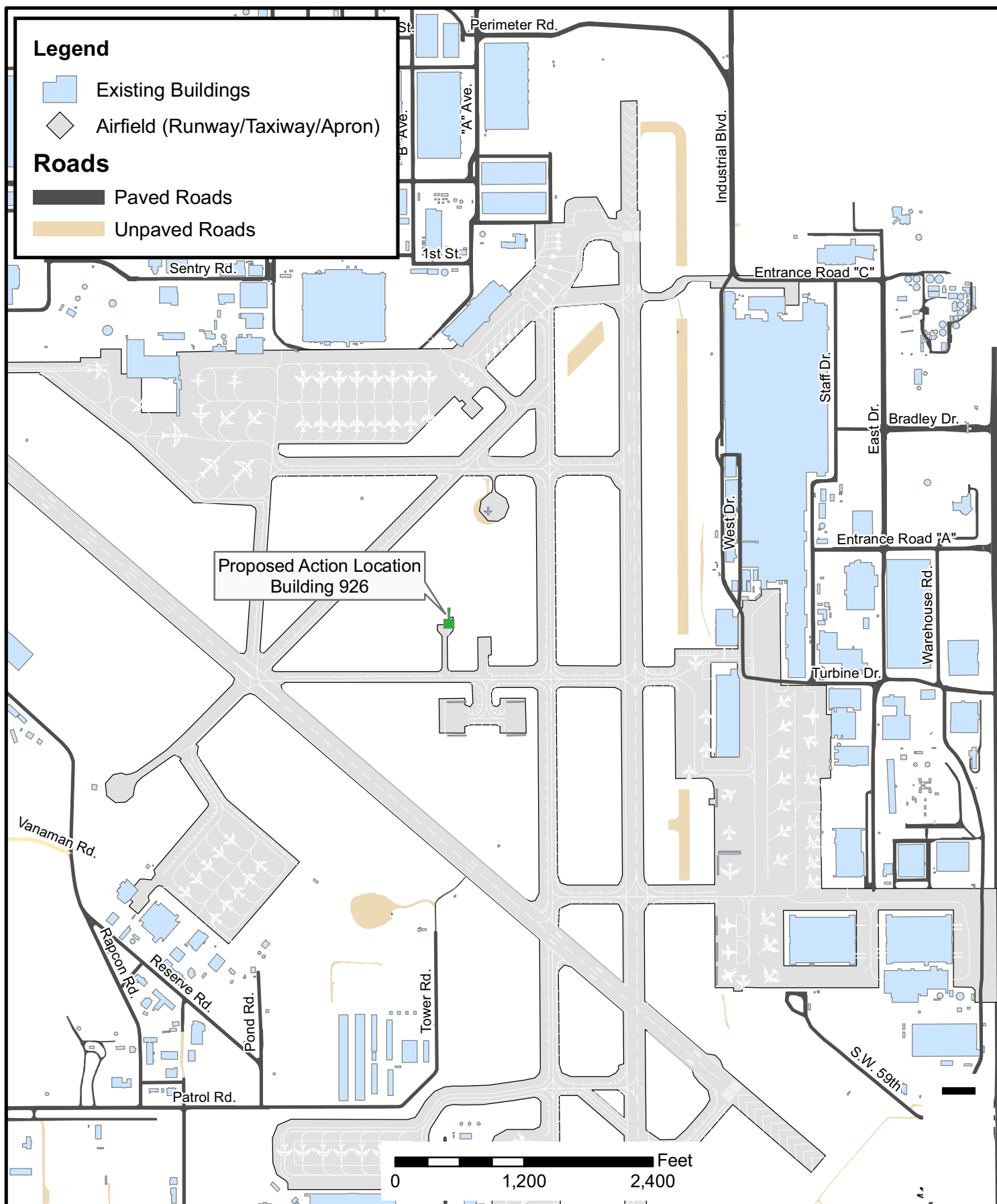
2.1 Introduction

The USAF has determined that an increase in engine testing workload, including the number and types of engine ground runups, is necessary at Tinker AFB; therefore, additional hush house capacity is needed to accommodate the increase in engine testing. Additionally, siting of the hush house should comply with siting recommendations stated in the *Hush House Siting Bulletin, Base Comprehensive Planning* (Air Force Logistics Command [AFLC] 1987). As required by NEPA, the potential impacts of the Proposed Action on the human and natural environment must be evaluated, and reasonable alternatives to the Proposed Action must be considered.

2.2 Proposed Action

The Proposed Action is to reactivate an existing hush house (Building 926, comprising approximately 13,000 square feet) for engine testing. Building 926 is located between the two operational runways at Tinker AFB (Figure 2-1) and complies with all hush house siting requirements. The hush house has been inactive for a number of years and during that period had been used for storage by several base organizations.

The Proposed Action would include renovation of Building 926 and its associated systems including fire suppression, electrical and communication services, and potable water system. The current halon fire suppression system is expected to be repaired and updated. The fire suppression system would be managed by 579 BSS/GBLC. A Dash 60 generator, which provides electricity and air, would be operated at the site. The hush house is not connected to Tinker AFB's sanitary or industrial wastewater system; historically, this facility had been served by a septic system. Under the Proposed Action the septic system would be properly abandoned and lavatory facilities would be provided off site. A separate plan, not associated with the Proposed Action, includes the construction of an administrative facility, including a restroom facility, on the airfield within the vicinity of the hush house, which would be used by hush house personnel. Until the permanent restroom facility is constructed, a temporary facility (portable restrooms) would be used for a period up to but not exceeding one year. The proponent organization would obtain permission for the temporary facility and would be responsible for submitting information on the location and use of the facility as well as best management practices to ensure that storm water is protected and Tinker AFB complies with National Pollutant Discharge Elimination System regulations.



EA

**Proposed Action Location
T-10 Hush House
Tinker Air Force Base**

**FIGURE
2-1**

A 2,500-gallon mobile fuel tank trailer would be stored in the containment area outside of Building 926 and connected via a three-inch line to support hush house operations. This tank would need to be properly registered with the OCC. The existing secondary containment for on-site fuel storage would be evaluated to verify that it meets all requirements to accommodate the 2,500-gallon fuel tank. Any required upgrades to the secondary containment would be completed prior to placement of a fuel tank outside the hush house. The existing underground oil/water separator at the facility would be inspected and reactivated in compliance with Oklahoma Administrative Code (OAC) 165:26 Aboveground Storage Tank (AST) regulations. Additionally, the oil/water separator will be added to the Oil/Water Separator Maintenance List to ensure periodic pumping.

The hush house *augmenter tube* is an oval tube 79-feet in length through which exhaust gas exits the hush house. The augmenter tube associated with Building 926 is currently being refurbished (by means of *repacking*). Repacking involves replacement of basalt wool pillows within the tube that serve to dampen the external transmission into the environment of noise and vibration generated from engine testing within the hush house. Repacking the tube is intended to reduce potential vibrations from engine testing operations occurring within the hush house.

The Proposed Action also includes the addition— and overall basewide increase— of engine testing operations at Tinker AFB. The current and expected monthly average volume of engines for this facility is included in Table 2-1.

Table 2-1. Current and Forecast Monthly Average Tempo of Engine Testing by Type at Tinker AFB

Engine	Current (Fiscal Year [FY] 2008) ¹	Projected Long-Term Workload ²
F100-PW -220, -229	3	16
F101-GE-102	3	3
F110-GE-100, -129	4	12
TF-33-100, -102, -103	0	3

Source: 76 Maintenance Wing (MXW) 2008

¹ Rounded to nearest whole engine

² Rounded to nearest whole engine

The projected total number of engines to be tested annually in the T-10 hush house facility is approximately 413. However, this number may fluctuate and would be determined by the number of engines received from the field for repair.

The hush house would be considered a 24-hour operation (i.e., engines could be tested all days at all hours), with three shifts of three-person crews, staffed with existing Tinker AFB personnel. No new personnel positions are anticipated to be generated by implementation of the Proposed Action. Crews would arrive together at the hush house in a single vehicle that would be left onsite in an existing parking facility during shifts; no new parking facilities would be required.

Training operations for personnel working in the hush house would have a mobility component which would train staff to minimize impact on transportation, circulation, and runway traffic.

2.3 Alternatives

Alternatives to the Proposed Action have been considered and two were identified to be carried forward for further analysis, including the No-Action Alternative. A description of each alternative follows as does a summary of its adequacy for achieving the project's objectives. A full analysis of potential environmental impacts associated with implementation of each alternative is presented in *Section 4, Environmental Consequences*.

2.3.1 Alternative 1: Refurbish Building 3703 and 3234

Implementation of Alternative 1 would involve refurbishment of Buildings 3703 and 3234 to accommodate the increase in the engine testing workload at Tinker AFB (Figure 2-2). Buildings 3703 and 3234 are currently used for engine testing; however, neither Building 3703 nor 3234 can currently accommodate the F100-229 engine. This alternative was not selected as the Proposed Action location because the facilities could not be modified to accommodate testing of these two engines within the required timeline to accommodate the proposed engine testing workload. Additionally, this alternative would require the greatest disruption of base operations and commitment of financial resources.

2.3.2 Alternative 2: No-Action Alternative

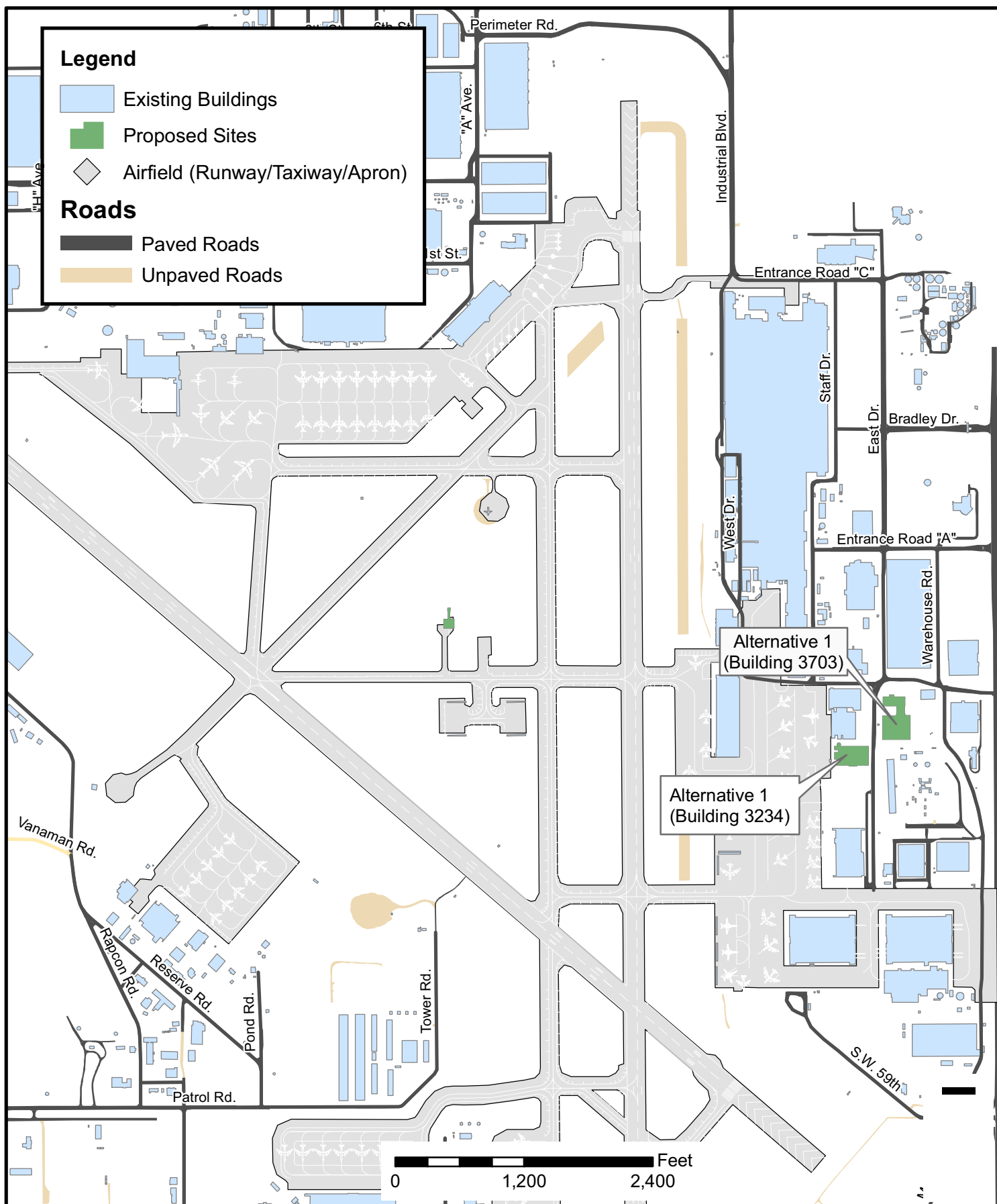
Under the No-Action Alternative, Tinker AFB would not implement the Proposed Action resulting in:

- the midfield T-10 Hush House would remain unoccupied/unused,
- engine testing would continue as is currently performed in Buildings 3703 and 3234,
- testing of the F100-229 engine could not occur at the base, and
- the OC-ALC could not increase either its capacity or tempo of testing engines.

Although this alternative would not fulfill the purpose or need of the Proposed Action, this alternative is carried forward as required by the CEQ. CEQ's regulations for the implementation of NEPA stipulate that the No-Action Alternative must be considered to assess environmental consequences that may occur if the Proposed Action is not implemented.

2.4 Reasonably Foreseeable Concurrent Actions

Implementation of the Proposed Action and associated potential environmental impacts would occur concurrently with other projects and developments proposed on Tinker AFB in the airfield environment, the Eastside Depot Maintenance District, and in the vicinity of that area of the base. In addition to the Proposed Action, projects planned for the next five years on Tinker AFB include:



EA

**Alternative 1
T-10 Hush House
Tinker Air Force Base**

**FIGURE
2-2**

- Depot Maintenance and Reengineering Transformation (DMRT) Three-Bay Hangar Construction
- Air Traffic Control Tower Construction
- Military Family Housing Privatization
- Realignment of Air Depot Road/Tinker Gate
- 507th Base Realignment and Closure (BRAC) Action
- Defense Logistics Agency (DLA) Warehouse Construction
- Tinker Aerospace Complex
- Construction of Medical Clinic
- Child Development Center Construction
- Physical Fitness Center Construction
- Consolidated Security Forces, South 40 Development
- Construction of Consolidated Wing Headquarters Facility
- Demolition of B3108
- Phase III, 3rd Combat Communications Complex Construction
- Consolidated Fuel Overhaul, Repair, and Test Facility

The projects listed and their associated cumulative impacts will be further discussed and analyzed in *Section 5, Cumulative Impacts*.

2.5 Summary of Potential Impacts

Potential impacts are evaluated and described in *Section 4, Environmental Consequences*. Table 2-2 provides a summary of the potential impacts for resource areas fully evaluated and associated with the Proposed Action, Alternative 1, and the No-Action Alternative. Table 2-3 provides a summary of resource areas that were not evaluated further due to no impacts to those resources from the Proposed Action, Alternative 1, and the No Action Alternative.

Table 2-2. Summary of Impacts for Fully Evaluated Resources

Resource	Proposed Action	Alternative 1	No-Action Alternative
Air Quality	Combustion emissions associated with refurbishment-related vehicles and equipment would be minimal because most vehicles would be driven to and kept at the affected site for the duration of refurbishment activities. Operational emissions are expected to increase with implementation of the Proposed Action. All estimated pollutant emissions were significantly below both primary and secondary NAAQS; therefore, no impact to human health or the environment is anticipated.	Air Quality impacts associated with Alternative 1 would be similar to the impacts associated with the Proposed Action. However, two engines would not be tested under Alternative 1, lowering hush house emissions. Other existing test facilities at the base would likely absorb the workload by increasing shift numbers. Such an increase would likely lead to increased emissions and impacts related to personnel transportation. In addition, the combination of increased nighttime operations and nighttime weather inversions may degrade air quality more than the Proposed Action.	Conditions would remain as described in <i>Section 3.1, Air Quality</i> .
Noise and Vibration	No sensitive receptors would experience an increase in sound levels, while on-base receptors would experience a negligible increase. With the implementation of military safety measures, noise impacts to individuals conducting tests would not be significant. Vibrations from engine testing are expected to be of short duration and frequency as to not significantly impact human health. Noise generated from refurbishment activity would be similar to existing ambient noise levels at Tinker AFB. Therefore, significant noise and vibration impacts are not expected to occur.	Implementation of Alternative 1 would result in similar noise and vibration impacts as the Proposed Action	Conditions would remain as described in <i>Section 3.2, Noise and Vibration</i> .

Table 2-2. Summary of Impacts for Fully Evaluated Resources (Cont.)

Resource	Proposed Action	Alternative 1	No-Action Alternative
Water Resources	<p>A mobile fuel tank trailer would be stored outside Building 926; any required updates to the on-site secondary containment would be completed prior to installation of the fuel tank. Therefore, impacts to surface water resources would be minimal. The proposed project site does not overlie any known groundwater contaminants. The proponent organization shall obtain permission for the temporary restroom facility and will be responsible for submitting information on the location and use of the facility as well as best management practices to ensure that storm water is protected and Tinker AFB complies with National Pollutant Discharge Elimination System regulations. Implementation of the Proposed Action would not modify or impact any existing wetlands or floodplains.</p>	<p>Implementation of Alternative 1 would involve refurbishment of Buildings 3703 and 3234 to accommodate the increase in the engine testing workload at Tinker AFB. This alternative would not impact water resources.</p>	<p>Conditions would remain as described in <i>Section 3.3, Water Resources</i>.</p>
Biological Resources	<p>The Proposed Action would occur in an area already disturbed by noise and heavy activity associated with flight and airfield operations. No threatened or endangered species are expected to occur in this area. Vibration associated with the hush house may disturb ground-dwelling animals. Therefore, implementation of the Proposed Action would negligibly affect the wildlife species that may utilize the site.</p>	<p>Alternative 1 would involve increasing operations in facilities that are currently used for engine testing; therefore, it would not impact biological resources.</p>	<p>Conditions would remain as described in <i>Section 3.4, Biological Resources</i>.</p>

Table 2-2. Summary of Impacts for Fully Evaluated Resources (Cont.)

Resource	Proposed Action	Alternative 1	No-Action Alternative
Transportation and Circulation	Implementation of the Proposed Action would require delivery of materials during refurbishment activities. Increases in traffic volumes associated with these activities would be short-term, not occurring beyond completion of the refurbishment. During operation, crews would arrive together in a single vehicle, to be left onsite during shifts. Therefore, no new parking facilities will be required. Implementation of the Proposed Action would result in fuel trucks, personnel, and engine traffic crossing the taxi-way. However, all traffic will use a proposed route that would result in negligible operation-related impacts.	Implementation of Alternative 1 would result in short-term traffic impacts during building refurbishment. No new personnel are anticipated so no additional parking would be required. The increased workload would likely result in a negligible increase in traffic related to additional engines being delivered to the site for testing..	Conditions would remain as described in <i>Section 3.5, Transportation and Circulation</i> .
Hazardous Materials and Wastes	Implementation of the Proposed Action would result an increase in the amount of fuel and lubrication oil used at Tinker AFB, but would result in only a slight increase in the volume of hazardous waste over time. No new hazardous waste accumulation points would be created. Any upgrades to the secondary containment would be made prior to placement of the generator fuel tank, and the tank would be properly registered with the OCC. Additionally, the existing underground oil/water separator would be inspected and reactivated in compliance with applicable regulations. Only negligible impacts involving hazardous materials and wastes would occur as a result of the Proposed Action.	Implementation of Alternative 1 would result in an increased volume of fuel and lubrication oil used but would result in only a slight increase in the generation of hazardous waste. The increased volume would be accommodated within the existing framework of the management, handling, and disposal process. Only negligible impacts involving hazardous wastes would occur as a result of this alternative.	Conditions would remain as described in <i>Section 3.6, Hazardous Materials and Wastes</i> .

Table 2-2. Summary of Impacts for Fully Evaluated Resources (Cont.)

Resource	Proposed Action	Alternative 1	No-Action Alternative
Safety	Implementation of the Proposed Action would not result in any activities occurring within or modifying established airfield CZs or APZs. Personnel will follow the same safety procedures currently in use for any vehicles entering an active airfield. Implementation of the Proposed Action would result in fuel trucks, personnel, and engine traffic crossing the taxi-way. However, all traffic will use a designated route and all drivers will be flight-linetrained. Therefore, no adverse impacts to airfield safety would result from implementation of the Proposed Action.	Alternative 1 would require Buildings 3703 and 3234 to be evaluated with upgrades as needed regarding the tempo of increased engine testing. Alternative 1 would not result in any activities occurring within or modifying established airfield CZs or APZs. Personnel will follow the same safety procedures currently in use for any vehicles entering an active airfield. Therefore, no adverse impacts to airfield safety would result from implementation of Alternative 1.	Conditions would remain as described in <i>Section 3.7, Safety</i> .

Table 2-3. Summary of No Impact for Resources Not Evaluated Further

Resource	Proposed Action	Alternative 1	No Action Alternative
Socioeconomic	The Proposed Action would result in no jobs being created or lost, and no civilian or military relocation would occur. Therefore, socioeconomic impacts would not occur.	For reasons similar to the Proposed Action, implementation of Alternative 1 would not result in impacts to socioeconomic conditions.	The No Action Alternative would have neither beneficial nor adverse effects on the socioeconomic conditions the surrounding area.
Environmental Justice and Protection of Children	Implementation of the Activities resulting from the Proposed Action would take place entirely within the perimeter of the base and would not extend to areas where children may be affected.	For reasons similar to the Proposed Action, implementation of Alternative 1 would not impact Environmental Justice and Protection of Children.	The No Action Alternative would have neither beneficial nor adverse effects on Environmental Justice and Protection of Children.

Table 2-3. Summary of No Impact for Resources Not Evaluated Further (Cont.)

Resource	Proposed Action	Alternative 1	No Action Alternative
Cultural Resources	The Proposed Action would not result in ground disturbing activities that have the potential to effect cultural resources. Additionally, the structure involved in the Proposed Action is not considered a Historic Property. Therefore, impacts to cultural resources would not occur.	For reasons similar to the Proposed Action, implementation of Alternative 1 would not result in impacts to Cultural Resources.	The No Action Alternative would have neither beneficial nor adverse effects on Cultural Resources.
Geological Resources	There would be no grading or other earthmoving activities undertaken as part of this Proposed Action. Therefore, impacts to geological resources would not occur.	For reasons similar to the Proposed Action, implementation of Alternative 1 would not result in impacts to Geological Resources.	The No Action Alternative would have neither beneficial nor adverse effects on Geological Resources.
Visual Resources	There would be no grading or other earthmoving activities undertaken as part of this Proposed Action. Therefore, impacts to visual resources would not occur.	For reasons similar to the Proposed Action, implementation of Alternative 1 would not result in impacts to Visual Resources.	The No Action Alternative would have neither beneficial nor adverse effects on Visual Resources.
Land Use	Activities would be limited to the existing Building 926. The existing zoning and land use classification would remain unchanged as the result of the Proposed Action. Therefore, impacts to land use in and around the base would not occur.	For reasons similar to the Proposed Action, implementation of Alternative 1 would not result in impacts to Land Use in and around the base.	The No Action Alternative would have neither beneficial nor adverse effects on Land Use in and around the base.

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SECTION 3 AFFECTED ENVIRONMENT

This section describes relevant existing environmental conditions for resources potentially affected by implementation of the Proposed Action and identified alternatives. In compliance with NEPA, CEQ regulations, and 32 CFR 989, the description of the affected environment focuses on only those aspects potentially subject to impacts.

In the case of the Proposed Action, the affected environment description is limited primarily to Tinker AFB and Oklahoma County. Resource descriptions focus on the following areas: air quality, noise and vibration, water resources, biological resources, transportation and circulation, hazardous materials and wastes, and safety.

3.1 Air Quality

3.1.1 Definition of Resource

Air quality in a given location is determined by the concentration of various pollutants in the atmosphere. National Ambient Air Quality Standards (NAAQS) are established by the US Environmental Protection Agency (EPA) under the Clean Air Act (CAA) for criteria pollutants, including: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter equal to or less than ten microns in diameter (PM₁₀) and 2.5 microns in diameter (PM_{2.5}), and lead (Pb). NAAQS represent maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect public health and welfare.

3.1.1.1 Criteria Pollutants

Air quality is affected by emissions from stationary sources (e.g., industrial development) and mobile sources (e.g., motor vehicles). Air quality at a given location is a function of several factors, including the quantity and type of pollutants emitted locally and regionally, and the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersion are wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and topography.

Ozone. The majority of ground-level (terrestrial) O₃ is formed as a result of complex photochemical reactions in the atmosphere involving volatile organic compounds (VOCs) and nitrogen oxides (NO_x) in the presence of oxygen. O₃ is a highly reactive gas that damages lung tissue, reduces lung function, and sensitizes the lung to other irritants. Although stratospheric O₃ shields the earth from damaging ultraviolet radiation, terrestrial O₃ is a highly damaging air pollutant and is the primary source of smog. As of March 2008, EPA issued the final rule for 8-hour O₃, revising the primary and secondary NAAQS standard. Both primary and secondary 8-hour standards are equal; both set limits to protect public health. As of June 2005, EPA revoked the 1-hour standard in all areas except non-attainment Early Action Compact Areas.

Carbon Monoxide. CO is a colorless, odorless, poisonous gas produced by incomplete burning of carbon in fuel. The health threat from CO is most serious for those who suffer from cardiovascular disease, particularly those with angina and peripheral vascular disease.

Nitrogen Dioxide. NO₂ is a highly reactive gas that can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Repeated exposure to high concentrations of NO₂ may cause acute respiratory disease in children. Because NO₂ is an important precursor in the formation of O₃ or smog, control of NO₂ emissions is an important component of overall pollution reduction strategies. The two primary sources of NO₂ in the US are fuel combustion and transportation.

Sulfur Dioxide. SO₂ is emitted primarily from stationary source coal and oil combustion, steel mills, refineries, pulp and paper mills, and from non-ferrous smelters. High concentrations of SO₂ may aggravate existing respiratory and cardiovascular disease; asthmatics and those with emphysema or bronchitis are the most sensitive to SO₂ exposure. SO₂ also contributes to acid rain, which can lead to the acidification of lakes and streams and damage trees.

Particulate Matter (PM₁₀ and PM_{2.5}). PM is a mixture of tiny particles that vary greatly in shape, size, and chemical composition, and can be comprised of metals, soot, soil, and dust. PM₁₀ includes larger, coarse particles, whereas PM_{2.5} includes smaller, fine particles. Sources of coarse particles include crushing or grinding operations, and dust from paved or unpaved roads. Sources of fine particles include all types of combustion activities (e.g., motor vehicles, power plants, wood burning) and certain industrial processes. Exposure to PM₁₀ and PM_{2.5} levels exceeding current standards can result in increased lung- and heart-related respiratory illness. EPA has concluded that finer particles are more likely to contribute to health problems than those greater than ten microns in diameter.

Airborne Lead (Pb). Airborne Pb can be inhaled directly or ingested indirectly by consuming lead-contaminated food, water, or non-food materials such as dust or soil. Fetuses, infants, and children are most sensitive to Pb exposure, which has been identified as a factor in high blood pressure and heart disease. Exposure to Pb has declined dramatically in the last ten years as a result of the reduction of Pb in gasoline and paint, and the elimination of Pb from soldered cans.

3.1.1.2 Clean Air Act Amendments

The Clean Air Act Amendments (CAAA) of 1990 place most of the responsibility to achieve compliance with NAAQS on individual states. To this end, EPA requires each state to prepare a State Implementation Plan (SIP). A SIP is a compilation of goals, strategies, schedules, and enforcement actions that will lead the state into compliance with all NAAQS. Areas not in compliance with a standard can be declared nonattainment areas by EPA or the appropriate state or local agency. In order to reach attainment status, NAAQS may not be exceeded more than once per year. A nonattainment area can reach attainment when NAAQS have been met for a period of ten consecutive years. During this time period the area is in transitional attainment, also termed maintenance.

3.1.2 Existing Conditions

3.1.2.1 Climate

Oklahoma County is located in the Interior Lowlands physiographic region. The County has two major land resource areas (MLRA): the eastern half of the county is in the Northern Cross Timbers MLRA and the western half is in the Central Rolling Red Prairies MLRA (US Department of Agriculture [USDA] 2003). In winter, the average daily temperature is 38.6 degrees Fahrenheit (°F), and the average daily minimum temperature is 27.8°F. In summer the average temperature is 80°F, and the average daily maximum temperature is 91.1°F. The average annual precipitation is 33.35 inches. The majority of precipitation, 74 percent, usually falls from April through October; average seasonal snowfall is 9.1 inches. Prevailing winds blow from the south with the average speed of 14 miles per hour in March and April (USDA 2003).

3.1.2.2 Local Air Quality

Oklahoma County is currently designated by the EPA as an attainment area for carbon monoxide, sulfur dioxide, and particulate matter (PM10 and PM2.5). Currently the Association of Central Oklahoma Governments (ACOG) is developing an 8-hour ozone flex plan for Oklahoma City. Ten air quality monitoring stations are located within Oklahoma County, including one CO monitoring station, one PM10 monitoring station, two PM2.5 monitoring stations, one SO2 monitoring station, three ozone monitoring stations, and two NO2 monitoring stations. According to EPA AirData, concentrations of PM10, PM2.5, NO2, and CO have not exceeded the primary NAAQS during the past ten years (EPA 2007). According to EPA AirData, concentrations of ozone have exceeded the 8-hour NAAQS in the past ten years (EPA 2007). In addition to criteria pollutants, the Oklahoma DEQ Air Quality Division regulates incinerators, particulate matter, cotton gins, smoke, and odors (DEQ 2006a).

3.1.2.3 Tinker AFB and Proposed Project Location

DEQ, which publishes regulations for air quality and permitting for all counties in Oklahoma, has jurisdiction over and regulates air emissions associated with Tinker AFB. Tinker AFB is located within Oklahoma County, which is in an Early Action Compact Agreement with EPA for 8-hour ozone and in attainment for all other criteria pollutants.

Under the CAAA, the Title V Operating Permit Program imposes requirements for air quality permitting on air emission sources. Tinker AFB is categorized as a major source under the Title V Program since its potential emissions from stationary sources exceed 100 tons per year (tpy) of any of the criteria pollutants, or ten tpy of any single Hazardous Air Pollutant (HAP), or 25 tpy of any combination of HAPs. Also under the CAAA, the National Emission Standards for Hazardous Air Pollutants (NESHAP) program specifies various provisions for regulated sources, including limits on HAP emissions, compliance demonstrations and performance testing, monitoring, record keeping, and reporting. The NESHAP program applies to Tinker AFB since

potential emissions of any single HAP equals or exceeds ten tpy and a combination of HAPs equals or exceeds 25 tpy. Tinker AFB maintains a Title V Air Permit (DEQ 2006b). Primary on-site emission sources at the Tinker AFB include:

- stationary combustion sources (boilers, water heaters, furnaces, gasoline and diesel-fuel generators, engine test cells);
- operational sources (chemical usage, paints, degreasers, abrasive blasting, welding operations, fuel cell maintenance, wastewater treatment, small arms firing range);
- fuel-storage/transfer operations (horizontal tanks, internal floating roof tanks); and
- mobile sources (vehicle operations, aircraft operations, trim and power checks, aerospace ground equipment [AGE]).

The proposed engine testing operations were analyzed during Tinker AFBs Prevention of Significant Deterioration (PSD) air permitting process (DEQ 2007).

3.2 Noise and Vibration

3.2.1 Definition of Resource

3.2.1.1 Noise

Noise is defined as unwanted sound or, more specifically, as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying (Federal Interagency Committee on Noise [FICON] 1992). Human response to noise can vary according to the type and characteristics of the noise source, the distance between the noise source and the receptor, the sensitivity of the receptor, and the time of day.

Due to the wide range in sound levels, sound is expressed in decibels (dB), a unit of measure based on a logarithmic scale. A 10-dB increase in noise level corresponds to a 100-percent increase (or doubling) in perceived loudness. As a general rule, a 3-dB change is necessary for noise increases to be noticeable to humans (Bies and Hansen 1988). Sound measurement is further refined by using an A-weighted decibel scale that emphasizes the range of sound frequencies that are most audible to the human ear (i.e., between 1,000 and 8,000 cycles per second). Unless otherwise noted, all decibel measurements presented in this EA are A-weighted (dBA).

Day-night average sound level (L_{dn}) is a noise metric that averages A-weighted sound levels over a 24-hour period, with an additional 10-dB penalty added to noise events occurring between 10:00 p.m. and 7:00 a.m. This penalty is intended to compensate for generally lower background noise levels at night and the additional annoyance of nighttime noise events. L_{dn} is the preferred noise metric of the US Department of Housing and Urban Development (HUD), the US Department of Transportation (USDOT), Federal Aviation Administration (FAA), EPA, Veterans' Administration, and US Department of Defense (DoD).

Two of the primary factors that reduce levels of environmental sounds are increasing the distance between the sound source and the receiver and having intervening obstacles such as walls, buildings or terrain features that block the direct path between the sound source and the receiver. Factors that act to increase the loudness of environmental sounds include moving the sound source closer to the receiver, sound enhancements caused by reflections, and focusing caused by various meteorological conditions.

Table 3-1 identifies noise levels associated with some common indoor and outdoor activities and settings and indicates the subjective human judgments of noise levels, specifically the perception of noise levels doubling or being halved. For reference purposes, a baseline noise level of 70 dB is described as moderately loud. As can be seen in the table illustrating the logarithmic dB scale, humans perceive an increase of 10 dB as a doubling of loudness, while an increase of 30 dB corresponds with an eight-fold increase in perceived loudness.

Table 3-1. Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at a given distance)	A-Weighted Sound Level Scale (dBA)	Noise Environment	Human Judgment of Noise Loudness ¹
Military Jet Takeoff with Afterburner (50 ft)	140		
Civil Defense Siren (100 ft)	130	Carrier Flight Deck	
Commercial Jet Takeoff (200 ft)	120		<u>Threshold of Pain</u>
Pile Driver (50 ft)	110	Rock Music Concert	32 times as loud 16 times as loud
Ambulance Siren (100 ft)	100		<u>Very Loud</u>
Newspaper Press (5 ft)			8 times as loud
Power Lawn Mower (3 ft)			
Motorcycle (25 ft)	90	Boiler Room	4 times as loud
Prop. Plane Flyover (1,000 ft)		Printing Press Plant	
Diesel Truck, 40 mph (50 ft)			
Garbage Disposal (3 ft)	80	High Urban Ambient Sound	2 times as loud
Passenger Car, 65 mph (25 ft)			<u>Moderately Loud</u>
Living Room Stereo (15 ft)	70		
Vacuum Cleaner (3 ft)			
Normal Conversation (5 ft)	60	Data Processing Center	1/2 as loud
Air Conditioning Unit (100 ft)		Department Store	
Light Traffic (100 ft)	50	Private Business Office	1/4 as loud

Table 3-1. Sound Levels of Typical Noise Sources and Noise Environments (Cont.)

Noise Source (at a given distance)	A-Weighted Sound Level Scale (dBA)	Noise Environment	Human Judgment of Noise Loudness ¹
Bird Calls (distant)	40	Lower Limit of Urban	<u>Quiet</u>
		Ambient Sound	1/8 as loud
Soft Whisper (5 ft)	30	Quiet Bedroom	
	20	Recording Studio	Just Audible
	10		Threshold of Hearing

¹Relative to a reference loudness of 70 dBA.

ft = feet

Source: FICON 1992.

3.2.1.2 Noise in the Airfield Environment

Aircraft Operations. Analyses of aircraft noise exposure and compatible land use around DoD facilities are normally accomplished using a group of computer-based programs, collectively called NOISEMAP (USAF 1992). NOISEMAP, through its program BASEOPS, allows entry of runway coordinates, airfield information, flight tracks, flight profiles (e.g., engine thrust settings, altitudes, and speeds) along each flight track for each aircraft, numbers of flight operations, run-up coordinates, run up profiles, and run up operations. The model's output comprises a regularly spaced "grid" file containing L_{dn} values. The NMPlot program uses the grid file to plot contours of equal L_{dn} , which can then be overlaid onto maps to depict current noise exposure levels in the Tinker AFB airfield environment. In airport noise analyses, noise contours are used to help determine compatibility of aircraft operations and local land use.

Noise levels from flight operations exceeding ambient background noise typically occur beneath main approach and departure corridors, near local air traffic patterns around the airfield, and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft take off and gain altitude, their noise contribution drops.

Engine Test and Maintenance Runs. Although noise resulting from aircraft flight operations represents the greatest contribution to the overall noise environment near the airfield, engine run-ups may also influence total ambient noise levels. Pre-flight engine run-ups and aircraft maintenance activities are typically confined to the aircraft parking ramps and engine test areas.

3.2.1.3 Vibrations

Vibration is an oscillatory motion which can be described in terms of the displacement, velocity, or acceleration. Because the motion is oscillatory, there is no net movement of the vibration element and the average of any of the motion descriptors is zero. *Displacement* is the easiest descriptor to understand. For a vibrating floor, the displacement is simply the distance that a point on the floor moves away from its static position. The velocity represents the instantaneous speed of the floor movement and acceleration is the rate of change of the speed. Vibration is an

oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity or acceleration.

Vibration is normally associated with activities such as railroads or vibration-intensive stationary sources but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. *Vibration displacement* is the distance that a point on a surface moves away from its original static position. The instantaneous speed a point on a surface moves is described as the velocity, and the rate of change of the speed is described as the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During project construction, the operation of construction equipment can cause ground-borne vibration. Analysis of this type of vibration is best measured in velocity and acceleration (FTA 2006).

The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the vibration signal and RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response (FTA 2006).

3.2.2 Existing Conditions

3.2.2.1 Regional Setting

The noise environment of communities surrounding Tinker AFB is characteristic of a moderately dense developed urban area, with some areas of undeveloped land south of the base. The urban developed setting typically experiences noise associated with vehicles on highways, railways, aircraft, or industrial activities. Undeveloped areas typically experience noise associated with local highways, aircraft, or light industrial activities. According to FICON, the following communities have the indicated typical ranges of outdoor L_{dn} noise levels: *Rural*, 40 to 48 L_{dn} ; *Small Town and Quiet Suburban*, 45 to 55 L_{dn} ; *Urban Residential*, 58 to 62 L_{dn} ; *Suburban and Low Density Urban*, 52 to 60 L_{dn} ; and *Noisy Urban Residential* 63 to 67 L_{dn} (FICON 1992). Civilian areas adjacent to the airfield support residential, commercial, public/quasi-public and open/agricultural/low density. Much of the area surrounding the base to the north, east, and west contains moderately dense residential, while areas to the south are sparsely populated with noise levels of correspondingly low magnitude. Tinker AFB aircraft activity is the dominant noise producer in the region with residences and an elementary school present within the 65+ L_{dn} contour.

3.2.2.2 Tinker AFB and Proposed Project Location

According to the 2006 Air Installation Compatible Use Zone (AICUZ) Study, 65 to 75 L_{dn} noise contours associated with aircraft operations extend beyond the boundary of Tinker AFB to the north and 65 to 80 L_{dn} noise contours extend off base to the south. Noise contours are concentrated around Runway 17/35, the primary runway at the base. Runway 17/35 is aligned in

a north-south direction, which allows aircraft to takeoff and land over relatively unpopulated areas to the south such that higher noise levels occur over areas which do not support sensitive noise receptors or noise-sensitive land uses. Off the ends of Runway 17/35, the 65 Ldn noise contour extends approximately three and four miles beyond the base boundary to the north and south, respectively. The entire 85+ Ldn noise contour is within the base boundary. Acreage impacted by aircraft operations at Tinker AFB is summarized in Table 3-2 (Tinker AFB 2006b).

Table 3-2. Noise Exposure Acreage from Aircraft Operations at Tinker Air Force Base
Exposure Acreage from Aircraft Operations at Tinker Air Force Base

Noise Level	Acreage Beyond Base Boundary	Total Acreage
65-69	3,710	4,391
70-74	1,239	1,978
75-79	549	1,203
80+	75	844
Total > 65	5,573	8,416

Source: Tinker AFB 2006b.

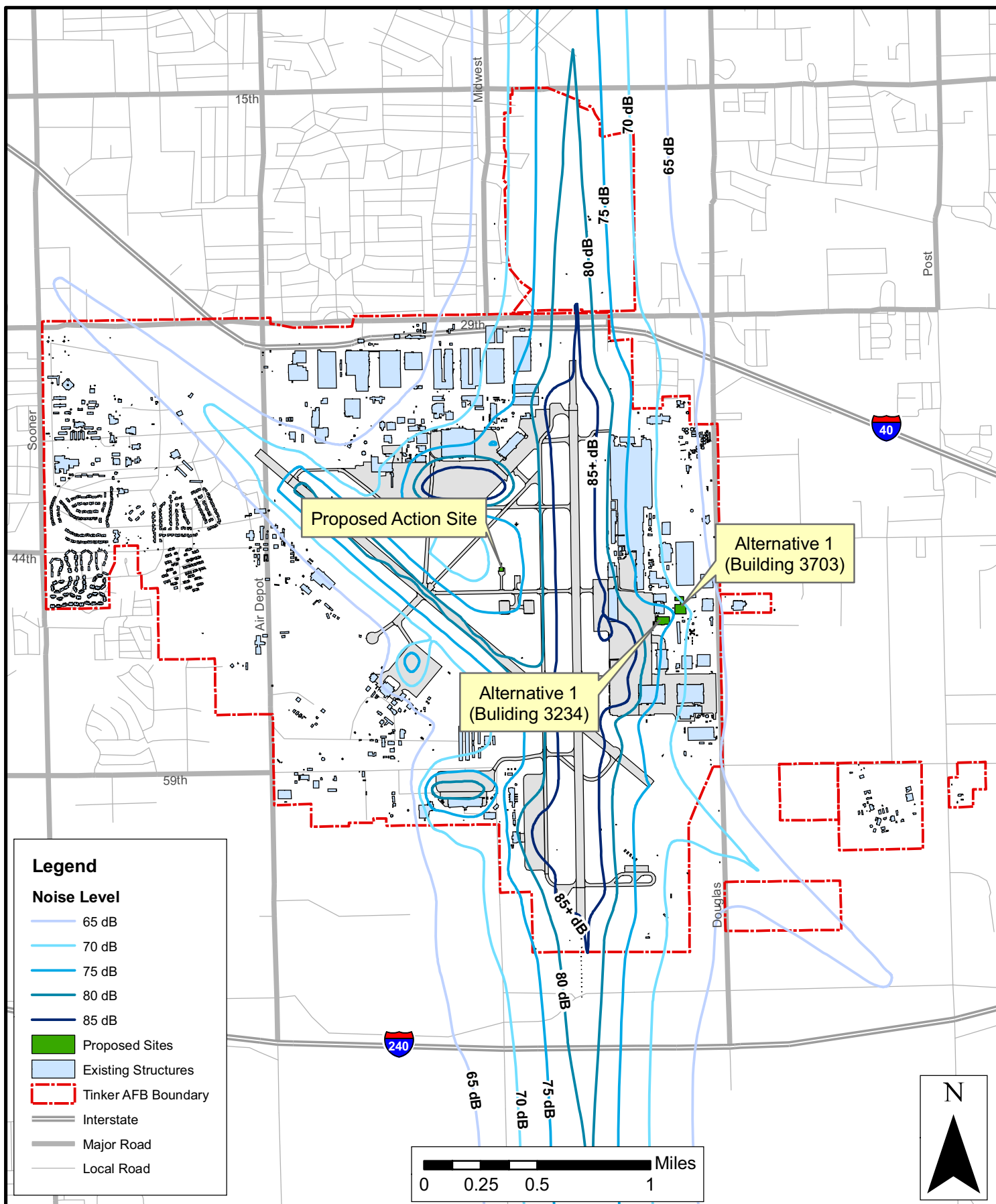
The Proposed Action site falls between the 70-75L_{dn} contour lines (Figure 3-1). The Alternative 1 sites fall between the 70-75L_{dn} (Building 3703) and 75-80L_{dn} (Building 3234) contour lines (Figure 3-1).

Current vibration levels at Tinker AFB are the result of aircraft operations, both during aircraft departures and aircraft engine maintenance and test runs. Vibration levels are short-term during aircraft departures and occur during engine maintenance and test runs at higher power settings (military power and afterburner), which varies depending on engine type. The majority of maintenance and test engine runs occurring at the higher power settings take place in areas with noise suppression with the exception of those that take place on the two trim pads located in between the two active runways. Off-base receptors are not exposed to vibration levels from Tinker AFB aircraft operations that exceed background vibration levels. Human response to vibration is depicted in Table 3-3.

Table 3-3. Human Response to Vibration

Response Level	Peak Particle Velocity (inches per second)
Imperceptible	0.001 to 0.01
Slightly Perceptible	0.01 to 0.03
Distinctly Perceptible	0.03 to 0.1
Strongly Perceptible	0.1 to 0.3
Disturbing	0.3 to 0.93
Very Disturbing	0.93 +

Source: American National Standards Institute 1983, Wiss 1981



EA

**Baseline Noise Level Contours
T-10 Hush House
Tinker Air Force Base**

FIGURE

3-1

3.2.2.3 Noise Abatement Procedures

Avoidance of noise-sensitive areas is emphasized and takeoff patterns are routed to avoid these locations as much as possible. For example, the majority of departures and approaches occur on Runway 17/35 to avoid populated areas. Also, efforts are made to control and schedule missions to keep noise levels low, especially at night.

Quiet hours are in effect for the Tinker AFB Airfield, as outlined in the AICUZ and Tinker AFI 13-201. Quiet hours and procedures outlined in Tinker AFI 13-201 include:

- Night quiet hours
- Day quiet hours
 - Modified quiet hours
 - Full quiet hours

Night quiet hours are in effect from 10:30p.m. to 6:00a.m. Scheduled full-stop landing, departures, and necessary taxi operations are the only authorized actions during night quiet hours. Engine runs above idle power and practice instrument approaches/visual flight rules (VFR) pattern work are not authorized. Exceptions to this rule include locally assigned aircraft equipped with CFM-56 turbo fan engines.

Day quiet hours are approved by 72 ABW/CV and are reserved for special events. Modified quiet hours or full quiet hours may be requested. During modified quiet hours, only full-stop landings, departures, or practice instrument approaches/VFR pattern work are authorized. Certain other activities may be approved by the Airfield Manager. AGE Equipment will not be run in the immediate area of the event for which modified quiet hours were approved.

Day quiet hours may also be requested as full quiet hours. During full quiet hours, full-stop landings, departures, and practice instrument approaches are not generally authorized, but some activities may be approved by the Airfield Manager. AGE Equipment will not be run in the immediate area of the event for which full quiet hours were approved.

Procedures for requesting quiet hours are included in Tinker AFI 13-201.

Twelve noise complaints were registered in 2005 and 8 noise complaints were registered as of 4 December 2006 at Tinker AFB; however, these complaints cannot be exclusively attributed to aircraft operations associated with based aircraft and transient military aircraft also utilize Tinker AFB's airfield (Tinker AFB 2006b).

3.3 Water Resources

3.3.1 Definition of Resource

Water resources analyzed in this EA include surface and groundwater resources, including the quality and availability of surface and groundwater, wetlands, and the potential for flooding. Surface water resources include lakes, rivers, and streams and are important for a variety of reasons including economic, ecological, recreational, and human health. Groundwater includes the subsurface hydrologic resources of the physical environment and is an essential resource in many areas; groundwater is commonly used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition.

Wetlands are defined by the US Army Corps of Engineers (USACE) and EPA as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. As defined in 1984, wetlands generally include swamps, marshes, bogs, and similar areas” (33 CFR 328.3 [b]). Wetlands provide a variety of functions including groundwater recharge and discharge, flood flow alteration, sediment stabilization, sediment and toxicant retention, nutrient removal and transformation, aquatic and terrestrial diversity and abundance, and uniqueness. Three criteria are necessary to define wetlands: vegetation (hydrophytes), soils (hydric), and hydrology (frequency of flooding or soil saturation). *Hydrophytic vegetation* is classified by the estimated probability of occurrence in wetland versus upland (non-wetland) areas throughout its distribution. *Hydric soils* are those that are saturated, flooded, or ponded for sufficient periods during the growing season and that develop anaerobic conditions in their upper horizons (i.e., layers). Wetland hydrology is determined by the frequency and duration of inundation and soil saturation; permanent or periodic water inundation or soil saturation is considered a significant force in wetland establishment and proliferation. Jurisdictional wetlands are those subject to regulatory authority under Section 404 of the Clean Water Act (CWA); Executive Order (EO) 11990, *Protection of Wetlands*, requires analyses of potential impacts to wetlands related to proposed federal actions.

Other issues relevant to water resources include watershed areas affected by existing and potential runoff and hazards associated with 100-year floodplains. Floodplains are belts of low, level ground present on one or both sides of a stream channel and are subject to either periodic or infrequent inundation by flood water. Inundation dangers associated with floodplains have prompted federal, state, and local legislation that limits development in these areas largely to recreation and preservation activities. EO 11988, *Floodplains Management*, requires actions to minimize flood risks and impacts. Under this order, development alternatives must be considered and building requirements must be in accordance with specific federal, state, and local floodplain regulations.

3.3.2 Existing Conditions

3.3.2.1 Regional Setting

Surface Water

Oklahoma County's landforms drain into the North Canadian River. The northern portion of the County drains into the Crutcho Creek Drainage Basin and into the North Canadian River, and the southern portion drains into the Elm Creek and Hog Creek Drainage Basins and into the South Canadian River, both of which are headwaters for the Arkansas-Mississippi River Basin. The North Canadian River runs west to east through Oklahoma County. The entire County is part of the Arkansas River Basin (US Fish and Wildlife Service [USFWS] 2006a).

Several drainage corridors traverse Oklahoma County close to Tinker AFB, including Brock Creek, East Elm Creek, Crutcho Creek, West Hog Creek, East and West Forks of Wildhorse Creek, Bluff Creek, Walnut Creek, and Soldier Creek. Surface waters occur in three main stream systems, one which drains to the north (Crutcho Creek with Kuhlman and Soldier Creek tributaries) and two to the south (East Elm Creek and West Hog Creek). The north-flowing stream system originates approximately two miles south of Tinker AFB's current southern boundary with on-base portions of the system comprising 12 smaller, first-order tributaries; two larger, second-order tributaries; and one main, third-order tributary. The south-flowing systems consist of only first- and second-order tributaries with higher-order tributaries located off base. Several other minor creeks and draws feed into the previously-mentioned major creeks (Oklahoma Water Resources Board [OWRB] 2006).

Groundwater

Aquifers which underlie Oklahoma County include both ephemeral (short-lived) and perennial (lasting the entire year) aquifers. The most important source of potable groundwater in the Oklahoma City metropolitan area is the Central Oklahoma Aquifer system. This aquifer extends under much of central Oklahoma and includes water in the Garber Sandstone and Wellington Formation, the overlying alluvium and terrace deposits, and the underlying Chase, Council Grove, and Admire Groups. The Garber Sandstone and the Wellington Formation portion of the Central Oklahoma Aquifer system is referred to commonly as the "Garber-Wellington Aquifer" and is considered to be a single aquifer because these units were deposited under similar conditions. Many of the best producing water wells are completed in this zone. On a regional scale, the aquifer is confined above by the less permeable Hennessey Group and below by the Late Pennsylvanian Vanoss Group. The regional dip of these formations is generally to the west (Parkhurst et al. 1993).

Tinker AFB lies within the recharge area of the Garber-Wellington Aquifer. The direction of the regional water table gradient under Tinker AFB is reported to range generally from west/northwest to southwest, depending on location, and has a magnitude ranging from 10 to 30 feet per mile (Christenson et al. 1992). However, determination of horizontal gradients is made

difficult by the presence of a downward component of flow in the Garber-Wellington Aquifer. Both direction and magnitude of groundwater flow can be highly variable, both spatially and temporally, due to local variations in geology, sources of recharge, and the interaction between the shallow aquifer and streams. This aquifer is recharged primarily by infiltration of rainfall or surface water through fractures in the Fairmont Shale and directly into the Garber Sandstone (OWRB 2006).

The depth to groundwater ranges from a few feet to about 70 feet below ground surface (bgs) depending on local topography. Across the county, water can sometimes be found in shallow, thin, discontinuous perched zones located above the aquifer. Most water from the Garber-Wellington aquifer is of sufficient quality to be used for most industrial, agricultural, and domestic purposes. However, some contaminated groundwater plumes do exist, typically at a depth of 175 feet or shallower. This does not pose health concerns at this time since the producing zone (i.e., depth at which water from supply wells is obtained) is 200 feet or deeper. Also, there appears to be an aquitard at approximately 200 feet which hydraulically separates the deeper producing zone from shallower groundwater in the aquifer (Tinker AFB 2001).

Industrial operations, individual homes, farm irrigation, and small communities not served by a municipal distribution system also depend on the Garber Wellington Aquifer. Communities presently depending on surface supplies, such as Oklahoma City, Midwest City, and Del City, maintain wells tapping the Garber-Wellington Aquifer as a backup water supply in the event of drought.

Wetlands

Wetlands represent approximately two percent of the land area in Oklahoma (EPA 2006). Several wetlands are located in Oklahoma County; National Wetland Inventory (NWI) maps for the area indicate that these wetlands are primarily freshwater emergent, freshwater forested/shrub, freshwater pond, and riverine (USFWS 2006a).

Floodplains

Flood hazard areas of Oklahoma County are subject to periodic inundation that results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect public health, safety, and general welfare. The bulk of Federal Emergency Management Agency (FEMA) designated floodplains, 100-year and 500-year, for Oklahoma County exist along the North Canadian River and its major tributaries. However, no FEMA-designated floodplains exist along the smaller, intermittent streams (OWRB 2006).

The Floodplain Board of Oklahoma County appoints a county floodplain manager who administers and implements regulations and other appropriate sections of 44 CFR National Flood Insurance Program (NFIP) regulations pertaining to floodplain management. The duties and responsibilities of the Floodplain Board are to adopt, administer, and enforce floodplain management regulations that: (a) delineate floodplains and floodways, and delineate 100-year

flood elevations within all unincorporated areas of the County (these delineations shall be submitted to the OWRB); (b) preserve the capacity of the floodplain to carry and discharge regional floods; (c) minimize flood hazards; and (d) regulate the use of land in the floodplain (OWRB 2006).

3.3.2.2 Tinker AFB and Proposed Project Location

Surface Water

Surface drainage at Tinker AFB occurs in three primary drainage basins: 1) Crutcho Creek Drainage Basin, 2) Elm Creek Drainage Basin, and 3) Hog Creek Drainage Basin. These are further divided into 10 sub-basins or watersheds. The majority of land associated with Tinker AFB is drained by the Crutcho Creek Drainage Basin, which flows to the north into the North Canadian River. The Elm Creek and Hog Creek Drainage Basins flow to the south of the base into the Little River, which forms confluences with the South Canadian River (Tinker AFB 2007a).

On-base, open-flowing waters comprise a total of about eight linear miles. The first- and second-order segments are typically ephemeral or intermittent while the third-order segment is perennial. All base creek flows are the result of stormwater runoff (Tinker AFB 2007a). Stormwater runoff is collected by various diversion structures and discharged to surface streams. Approximately five miles of stream channels within Tinker AFB lie within 100-year floodplains (USAF 1991).

In 2002, Tinker AFB developed the StormWater Pollution Prevention Plan (SWPPP) to comply with the conditions of the DEQ Multi-Sector General Permit (MSGP) for Storm Water Discharges Associated with Industrial Activities and DEQ Phase II Small Municipal Separate Storm Sewer System (MS4). The SWPPP provides base-wide and facility-specific Best Management Practices (BMPs) to reduce pollutants in stormwater discharges from the base. The BMPs for Tinker AFB include:

- Source controls,
- Management practices,
- Preventive maintenance,
- Spill prevention and response,
- Erosion and sediment controls, and
- Identification of stormwater pollution prevention personnel.

No significant point source industrial discharges currently are made to any waterway on Tinker AFB. In 1996, the base Industrial Wastewater Treatment Plant (IWTP) and Sanitary Treatment Plant (STP) discharges were rerouted to the Oklahoma City Public Owned Treatment Works. This eliminated flows of 1.3 million gallons per day to the on-base portion of Soldier Creek (i.e., East Soldier Creek) (Tinker AFB 2007a).

Groundwater

The direction of groundwater flow under Tinker AFB varies. There is an apparent groundwater divide associated with Crutch Creek that affects groundwater flow direction. Regional topographic lows draw portions of groundwater in the area southwestward, while other areas flow northward toward discharge points along Crutch Creek (Tinker AFB 2001).

Throughout much of the northern half of the base, the Garber-Wellington aquifer is not protected by any confining shale. In the southern half of the base, the Hennessey Group overlies the aquifer and acts as a confining layer because it is typical clay-rich, low-permeability shale. The confining nature of the Hennessey Group causes rainfall to remain near ground surface and flow laterally until it discharges to streams. The groundwater system at Tinker AFB has been divided into five hydrogeologic zones: the Hennessey Water Bearing Zone, the Upper Saturated Zone (USZ), the Lower Saturated Zone (LSZ), the Lower-Lower Saturated Zone (LLSZ), and the Production Zone (PZ). The USZ and LSZ are regionally considered to be in the upper third of the Garber-Wellington aquifer, and generally are present at depths of less than 200 feet bgs. The LLSZ is considered the lower half of the LSZ. The PZ generally is considered to be greater than 200 feet bgs, and is used for water supply at Tinker AFB and off-base locations (Tinker AFB 2001). Tinker AFB is located in a recharge area for these water-bearing zones; groundwater is derived primarily from precipitation and from infiltration of surface streams.

Groundwater at Tinker AFB is found under either water table or confined conditions. The depth to water ranges from a few feet to about 70 feet bgs depending on the local topography. Across Tinker AFB, water can sometimes be found in shallow, thin, discontinuous perched zones located above the aquifer.

The approximate direction of groundwater flow in the Garber-Wellington aquifer is south and southwest across the southern half of the base and west to northwest across the northern half. Shallow groundwater may discharge to surface streams (gaining stream) or be recharged by streams (losing stream) (OWRB 2006). Both situations occur at Tinker AFB along Crutch Creek and Soldier Creek. In contrast, water in the Hennessey Water Bearing Zone generally flows to the northeast toward Crutch Creek from higher topographic areas along the south boundary of the base (Tinker AFB 2002).

Wetlands

In 1995, approximately 65 acres of wetlands were identified on Tinker AFB by USFWS using NWI criteria; these wetlands included creeks, ponds, drainage swales, and other wet areas. Of the 65 acres, 7.9 acres were later classified by the USACE as jurisdictional wetlands under the CWA. The 7.9 acres were divided among five wetland areas: Ground Water Treatment Plant (GWTP) wetland (0.5 acres); Fuel Control Facility wetland (0.8 acres); Greenway wetland (4.8 acres); Compressed Natural Gas (CNG) wetland (0.3 acres); and the Glenwood wetland (1.5 acres, on-base portion only). This excluded the off-base portion (8.5 acres) of the Glenwood wetland which was located immediately adjacent to and east of the base on county and private land (Tinker AFB 2007a). In 2002, these 65 acres (73 individual wetland areas) were reassessed

to track their status and trend (Tinker AFB 2007a). Based on the survey, only two wetlands (i.e., Greenway and Prairie Pond) were classified as high quality wetlands. Thirty-four were classified as intermediate quality, and six as low quality. This study also determined that 31 of the original 73 NWI wetland areas no longer existed or were actually drainage ditches or wet-weather conveyances that did not function as wetlands or aquatic habitat and therefore were not included in the survey. These non-wetland areas covered approximately 27 acres, and most were within the airfield or other highly industrialized areas of the base. Therefore, the current total NWI acreage on Tinker AFB is estimated at 38 acres. These have not been officially “delisted” as wetlands by the USFWS who conducted the original study (Tinker AFB 2007a).

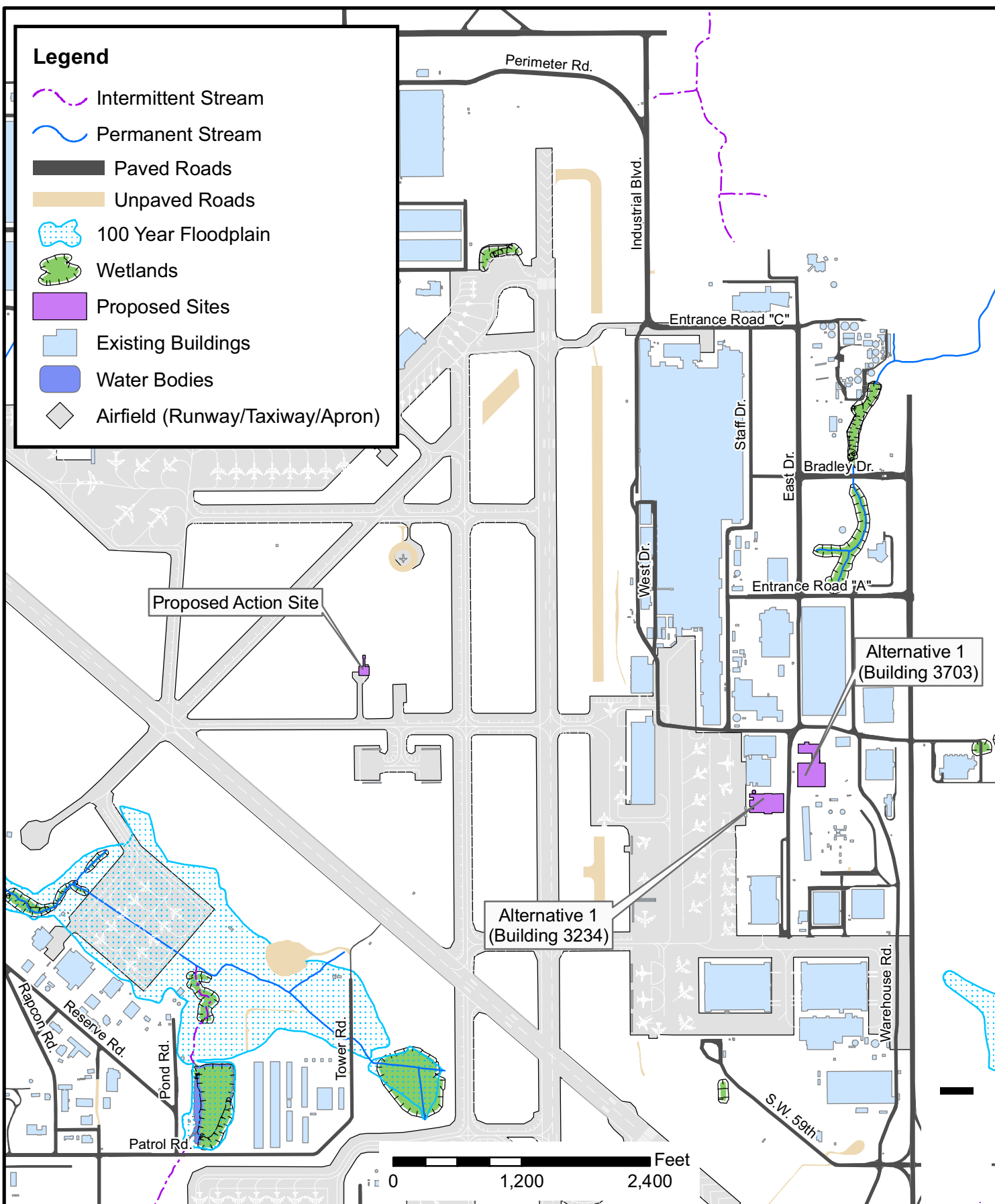
All jurisdictional wetlands on Tinker AFB were man-made with the exception of the Glenwood wetland, which was created by beaver activity. The GWTP wetland is located on a Superfund site and therefore is regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) by the EPA. The vegetation and soils of the GWTP wetland were removed in 1999 as part of a Soldier Creek remediation effort (Tinker AFB 2005).

No wetlands are located on or near either the Proposed Action site or the Alternative 1 location (Figure 3-2).

Floodplains

In October 2002, USACE, Southwestern Division-Tulsa District, completed a study for Tinker AFB to update the 100-year and 500-year floodplains. The 100-year and 500-year floodplains were reassessed for the Middle Branch, Upper Crutcho Creek (the Eastern Branch), and Upper Crutcho Creek (Western Branch) (USACE 2002). Crutcho Creek and its tributaries and Kuhlman Creek are bounded by 100-year and 500-year floodplains designated by FEMA. These floodplains affect approximately 520 acres of base land (Tinker AFB 2007b). The bulk of these floodplains are located along Crutcho Creek. However, no FEMA-designated floodplains exist along the smaller, intermittent streams that exist on the base (USACE 2002). No 100- or 500-year floodplains have been designated on the Proposed Action site or Alternative 1 location (Figure 3-2).

Regarding floodplain functions, the overall general status of Tinker AFB’s 100-year floodplain is poor. However, the trend is upward because of conversion of some floodplain improved and semi-improved grounds to natural areas in recent years. Although no specific monitoring of floodplain functions has been accomplished in the past, projects are scheduled to provide the foundational data for measuring progress towards development of a healthy floodplain on Tinker AFB (Tinker AFB 2007a).



EA

**Wetlands, Waterbodies, and Floodplains
T-10 Hush House
Tinker Air Force Base**

**FIGURE
3-2**

3.4 Biological Resources

3.4.1 Definition of Resources

Biological resources include native or naturalized plants and animals and the habitats in which they occur. Sensitive biological resources are defined as those plant and animal species listed as threatened or endangered, candidate, rare, and other sensitive flora and fauna, or proposed as such, by the USFWS and respective State agencies. Federal and State Species of Concern are not protected by law; however, these species could become listed or protected at any time if not properly managed. Threatened and endangered species are federally protected plants and animals that are in danger of becoming extinct without protection. These species may be rare because of specialized habitat needs or habitat destruction. The ESA of 1973 protects listed species against killing, harming, harassment, or any action that may damage their habitat.

3.4.2 Existing Conditions

3.4.2.1 Regional Setting

The landscape of Oklahoma County is characterized by level to gently rolling hills, broad flat plains, and bottomlands intersected by small to medium sized watercourses. The County is part of the Cross Timbers Vegetation Area of the Midwest and the Central Oklahoma/Texas Plains or Central Great Plains (Tinker AFB 2001).

Vegetation

The original vegetation cover in the central Oklahoma uplands consisted of mixed forests and woodlands interspersed with areas of open grasslands. These original plant communities have been radically altered through development, deforestation, intensive agriculture, and the introduction of invasive species (Tinker AFB 2001). However, many smaller portions of these vegetative communities still comprise Oklahoma County's vegetation. Upland forests integrated with woodlands and prairie comprise Oklahoma County's primary vegetation community. Intermixed in this community are woodlands of oaks, upland forests of deciduous or evergreen trees, and grasslands intermixed with blue grama (*Bouteloua gracilis*), buffalo grass (*Bouteloua dactyloides*), and non-native grasses (Hoagland 1999). The County's vegetative community also includes riparian areas adjacent to streams, drainage channels, and in low-lying areas where water availability is relatively greater than the surrounding landscape (Tinker AFB 2002).

Much of the native vegetative communities associated with Oklahoma City and the Tinker AFB area has been replaced with developed landscape and ornamental and non-native vegetation (University of Oklahoma [OU] 2006).

Wildlife

Approximately 350 native vertebrate species and a much greater unknown number of invertebrates have historically occurred either in the Central Oklahoma/Texas Plains or Central Great Plains Ecoregions (Oklahoma Department of Wildlife Conservation [ODWC] 2007). Some species that probably occurred on this land during pre-settlement times include prairie

dogs, bear, bison, wolves, elk, and horses. Numerous other species have been displaced by urban and industrial activities on and around Tinker AFB.

Five species are federally listed as threatened or endangered in Oklahoma County by USFWS. The State of Oklahoma has an endangered species act for plants and animals; species listed on the federal list correspond with those on the state list (Oklahoma Natural Heritage Inventory [ONHI] 2003) (Table 3-4).

Table 3-4. Special Status Plant and Animal Species of Oklahoma County

Scientific Name	Common Name	State Status ¹	Federal Status ¹
Birds			
<i>Haliaeetus leucocephalus</i>	Bald Eagle	T, Delisted ²	T, Delisted ²
<i>Vireo atricapillus</i>	Black-Capped Vireo	E	E
<i>Sterna antillarum</i>	Least Tern	E	E
<i>Charadrius melodus</i>	Piping Plover	T	T
<i>Grus americana</i>	Whooping Crane	E	E
<i>Tyto alba</i>	Barn Owl	CS, SS2	
<i>Buteo swainsoni</i>	Swainson's Hawk	SS2	
<i>Athene cunicularia</i>	Burrowing Owl	SS2	
<i>Lanius ludovicianus</i>	Migrant Loggerhead Shrike	SS2	
Fish			
<i>Notropis girardi</i>	Arkansas River Shiner	T	T
Mammals			
<i>Marmota monax</i>	Woodchuck	SS2	
Reptiles			
<i>Phrynosoma cornutum</i>	Texas Horned Lizard	SS2	
Plants			
<i>Penstemon oklahomensis</i>	Oklahoma Penstemon	S3	

¹Legal Status:

- E – Endangered
- T – Threatened
- CS – Statewide closed season (state ranking). It is unlawful at any time to possess or to kill individuals of these species or to remove any individuals of these species from their natural habitats.
- SS2 - Species of Special Concern (state ranking). These species have been identified by technical experts as possibly threatened of extirpation but for which additional information is needed.
- S3 - Rare and local in Oklahoma (though it may be abundant at some of its locations); in the range of 21-100 occurrences.

²Bald Eagle delisted from threatened status by USFWS on June 28, 2007.

Sources: USFWS 2007; Tinker AFB 2007a.

3.4.2.2 Tinker AFB and Proposed Project Location

Vegetation

The area now occupied by Tinker AFB was historically dominated by tall and/or mixed grass prairie (Tinker AFB 2007a). Less than 2 percent of the pre-settlement prairie ecosystem currently remains on Tinker AFB. No pristine native prairie or bottomland areas are present on the installation. Only a few small, fragmented prairie remnants, less than 100 acres total, remain,

and these are in degraded condition. Much of the original prairie was farmed as evidenced by remaining terraces at numerous locations on the base (Tinker AFB 2002). Approximately half of the Tinker AFB land area (2,620 acres) has been developed for buildings, roads, pavement, railroads, and other structures. About 20 percent of the current land area (1,036 acres) is periodically maintained grounds (i.e., semi-improved grounds) such as the airfield. Approximately 14 percent of the land (700 acres) is highly maintained grounds (i.e., improved grounds) such as lawns, athletic fields, and a golf course. The remaining 14 percent (684 acres) is not maintained (i.e., unimproved grounds), and includes areas such as the Urban Greenway and Glenwood areas (Tinker AFB 2001). Seven vegetation types (including 31 vegetation communities within those vegetation types) are found at Tinker AFB (Tinker AFB 2007a):

- Grassland – Characteristic of a native mid-grass prairie;
- Field – Successional stage of native and/or exotic species of grasses and forbs;
- Forest/Woodland – Close stand (forest) or open growth (woodland) in a natural area;
- Transitional Forest/Woodland – Successional stage of native and/or exotic trees configured in a close (forest) or open (woodland) stand, primarily in previously disturbed areas;
- Urban/Industrial – Dominated by turf grass, associated forbs, and ornamental herbaceous and woody plants;
- Transitional Urban/Industrial – Indigenous and exotic plants with a predominance of ornamental vegetation; and
- Wetland/Marsh – Dominated by mesophytes (plants growing under medium moisture conditions) and/or hydrophytes (plants growing under high moisture conditions) and located in areas temporarily or permanently inundated.

Within the areas that have been converted to urban and industrial use, the plant community comprises primarily turf grasses and ornamental trees and shrubs. The predominant turfgrass on Tinker AFB is Bermuda grass. Native buffalo grass is often found mixed with Bermuda grass. Other more rural areas are typically a mixture of exotic and native plants. Trees and shrubs are composed of native and exotic plants, and, contrary to pre-settlement plant distribution, many woody plants are found on upland as well as bottomland sites (Tinker AFB 2001). The Proposed Action site is currently classified as urban/industrial and is adjacent to an area classified as Fescue Nonnative Grass (Tinker AFB 2007a).

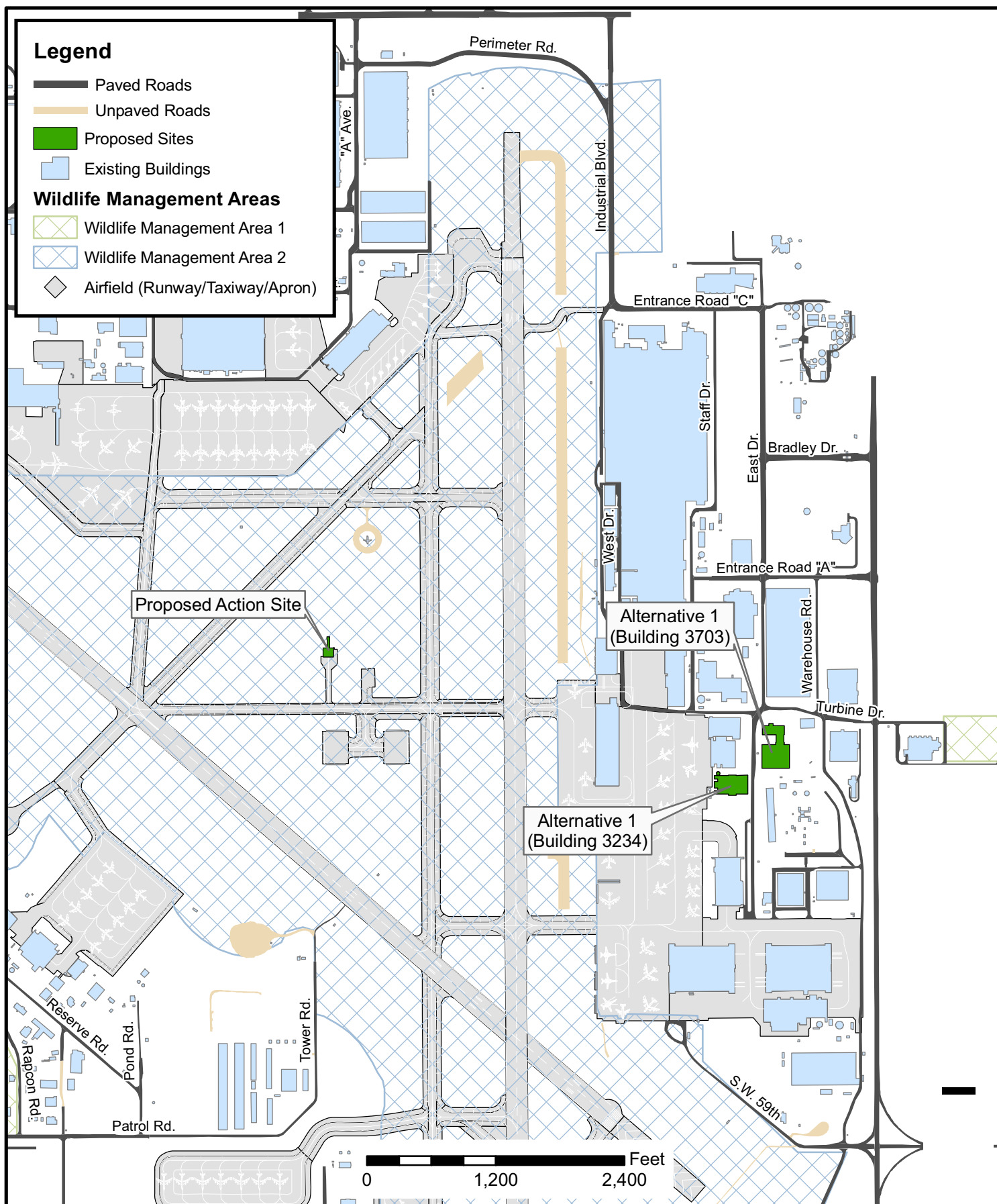
Wildlife

Wildlife at both the Proposed Action and alternative sites is limited to those species adapted to high levels of human activity and disturbance. Tinker AFB is classified as a Category 1 installation, as defined in AFI 32-7064, *Integrated Natural Resource Management*, meaning that suitable habitat for conserving and managing fish and wildlife exists (Tinker AFB 2007a). The available habitat includes movement corridors (e.g., riparian zones along creeks) and

pockets of undeveloped acreage surrounded by urbanized land (USAF 1991) (Figure 3-3). The results of a 1990 reconnaissance survey indicated that approximately 1,800 acres were suitable or potentially suitable as wildlife habitat (USAF 1991). Included in this estimate were approximately 400 improved acres (military family housing and golf course), 600 semi-improved acres (mostly airfield), and 800 unimproved acres.

Common mammalian species found on Tinker AFB include fox squirrel (*Sciurus niger*), eastern cottontail (*Sylvilagus floridanus*), beaver (*Castor canadensis*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), deer mouse (*Peromyscus maniculatus*), hispid cotton rat (*Sigmodon hispidus*), black-tailed jackrabbit (*Lepus californiscus*), and opossum (*Didelphis virginianus*) (USACE 1995; Tinker AFB 2007a). Resident bird species include mourning dove (*Zenaida macroura*), barn swallow (*Hirundo rustica*), red-winged blackbird (*Agelaius phoeniceus*), meadowlark (*Sturnella* spp.), scissor-tailed flycatcher (*Tyrannus forficatus*), great-horned owl (*Bubo virginianus*), and bobwhite quail (*Colinus virginianus*). Several reptile and amphibian species are commonly found at Tinker AFB. These include Texas horned lizard (*Phrynosoma cornutum*), ringneck snake (*Diadophis punctatus*), three-toed box turtle (*Terrapene carolina*), and bullfrog (*Rana catesbeiana*). The results of fish surveys at Tinker AFB indicate that 23 species of fish occur on base. Five species occur in ponds on the base while 18 species of fish occur in those portions of Crutch, Kuhlman, and Soldier Creeks that are located on Tinker AFB (Tinker AFB 2002). Some ponds on the facility have been stocked with fish including catfish (*Ictalurus punctatus*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and fathead minnows (*Pimephales promelas*).

The Proposed Action is located in the general habitat type: field. The field likely provides habitat for species typical of grasslands that can also tolerate disturbed urbanized habitats, such as deer mouse, cottontail, and meadowlark. Alternative 1 is located along an airfield and is in the general habitat type: transitional urban/developed. This area would provide very little habitat (Figure 3-3).



EA

**Wildlife Management Areas
T-10 Hush House
Tinker Air Force Base**

FIGURE

3-3

Threatened and Endangered Species

Field surveys were conducted at Tinker AFB during 1993 and 1994 to identify federally listed endangered or threatened species (USACE 1995) or state designated sensitive species (Johnson et al. 1995). No federal or state-listed threatened or endangered species were found during this survey or documented on other occasions on Tinker AFB (USACE 1995; Tinker AFB 2007a). However, the Oklahoma penstemon (*Penstemon oklahomensis*), which is classified as rare under the ONHI, has been documented at numerous locations on Tinker AFB (Tinker AFB 2007a). The ONHI lists the species as G3S3 (restricted range) (ONHI 2003).

One federally listed species is known to be a seasonal resident of the local area, the whooping crane (*Grus americana*). The nearest known sightings are around Lake Arcadia and Lake Thunderbird (approximately 9 miles and 22 miles from Tinker AFB, respectively). It is unlikely this species would forage along creeks and open areas adjacent to the proposed project site, as these habitats are generally urban and of poor quality for the subject species (Tinker AFB 2002). Base-wide surveys for the black-capped vireo (*Vireo atricapilla*) were conducted in 1993 and 1994, and none were sighted during these surveys (Tinker AFB 2002). This species is known to occur just south of Tinker AFB around Draper Lake (ODWC 2008). It is unlikely this species would occur on Tinker AFB, as low shrubland is the preferred habitat.

Three state special concern species were found within Tinker AFB during this survey. These include Texas horned lizard (*Phrynosoma cornutum*), barn owl (*Tyto alba*), and loggerhead shrike (*Lanius ludovicianus*). It is not known whether the loggerhead shrikes observed were the migrant race (*migrans*). Burrowing owl (*Athene cunicularia*) and Swainson's hawk (*Buteo swainsoni*), both state species of special concern, have also been documented within Tinker AFB (Tinker AFB 2007a). The USFWS defines species of concern for the future well-being of the species, but the species does not receive any protection under the ESA. AFI 32-7064, *Integrated Natural Resources Management*, states that species having such a status should be considered in future planning and facility siting as well as provided protection wherever possible. The state special concern species identified at Tinker AFB are discussed below.

Texas Horned Lizard. Texas Horned Lizards range from the South-Central US to Northern Mexico (Texas Parks and Wildlife [TPW] 2000). They occur in open areas with sparse to slightly more dense plant cover with corridors of sparse vegetation, in arid and semiarid habitats in Oklahoma. They primarily eat ants. The species has been documented in sparsely vegetated grassland areas in the southwest corner of Tinker AFB with isolated observations in the southeast and northern areas of the base (Tinker AFB 2007a). Sparsely vegetated areas within the proposed project site are quite limited. The species could possibly, but not likely, occur in these areas.

Barn Owl. The barn owl is found throughout most of the US and is a rare resident of most of Oklahoma. It usually occupies relatively open areas, such as prairies, meadows, and marshes. The barn owl nests and roosts in buildings, cliffs, and trees. The diet of the owl consists

primarily of rodents or small birds, and occasionally insects (Oberholser 1974). Barn owls have been observed in northeastern portions of Tinker AFB in the Glenwood area (USAF 1991).

Swainson's Hawk. Swainson's hawk occurs throughout the Tinker AFB on relatively open lands and has historically nested along Kuhlman Creek south of the golf course (Tinker AFB 2007a).

Burrowing Owl. Burrowing owls inhabit grasslands and are frequently associated with prairie dog colonies. They have been observed on the airfield and in Reserve 3 of the Urban Greenway in winter (Tinker AFB 2007a). The species is believed to be a winter visitor to Tinker AFB, and no nests have been documented.

Oklahoma Penstemon. Oklahoma Penstemon is found only in Oklahoma but is very abundant at numerous locations within Oklahoma (ONHI 2003). It is found in prairies, oak savannas, abandoned fields, and along roadsides (Johnson et al. 1995). The penstemon is located in fragmented remnant native prairie communities, primarily in the southeast portion of the base to include the airfield, EIG, and Douglas Field. Other small populations occur in the northeastern portion of Glenwood and at the Fuel Control Facility (Tinker AFB 2007a).

All DoD installations are required to perform a threatened and endangered species survey prior to any activities that disturb habitat that potentially supports such species. However, there are no threatened or endangered species known to occur in the immediate vicinity of the proposed hush house site. Further, no designated critical habitat or wilderness areas are located on or in the immediate vicinity of the base (USFWS 2006b & 2006c). Further information summarizing special status species potentially found at the proposed project site is included in Table 3-5.

Table 3-5. Special Status Species Potentially Occurring on the Proposed Action and Alternative 1 Site

Scientific name Common Name	Status	Habitat Requirements	Habitat	Range	Presence at Proposed Location
Federally Listed Species					
<i>Charadrius melodus</i> (Piping plover)	T	Sand/gravel areas on lakes, river, and ponds	U	C	UN
<i>Haliaeetus leucocephalus</i> (Bald eagle)	D, T	Trees or cliffs near water; oceans, rivers or lakes	U	C	UN
<i>Grus Americana</i> (Whooping crane)	E	Marshes	U	Mi	UN
<i>Sterna antillarum athalassos</i> (Interior least tern)	E	Islands/sandbars in large rivers; sandy areas, shallow water	U	C	UN
<i>Vireo atricapilla</i> (Black-capped vireo)	E	Low shrubland	U	C	UN
State Special Concern Species					
<i>Athene cunicularia</i> (Burrowing owl)	SS2	Grasslands, prairie dog colonies	U	C	UN
<i>Buteo swainsoni</i> (Swainson's hawk)	SS2	Plains, range, open hills, sparse trees	U	C	UN

Table 3-5. Special Status Species Potentially Occurring on the Proposed Action and Alternative 1 Site (Cont.)

<i>Scientific name</i> Common Name	Status	Habitat Requirements	Habitat	Range	Presence at Proposed Location
State Special Concern Species					
<i>Lanius ludovicianus migrans</i> ¹ (Migrant loggerhead shrike)	SS2 SC	Open country with scattered trees, scrub, deserts, roadsides	U	C	UN
<i>Phrynosoma cornutum</i> (Texas horned lizard)	CS SS2 SC	Semi-arid open country with sparse plant growth	U	C	UN
<i>Tyto alba</i> (Barn owl)	SS2	Feeds in grasslands; nests in caves, trees, and buildings	U	C	UN
ONHI					
<i>Penstemon oklahomensis</i> Oklahoma penstemon	G3S3	Prairies, oak savannas, abandoned fields, and along roadsides	U	C	UN

Sources: ODWC 2007; USAF 1991; Tinker AFB 2007a.

Key:

Status Codes*

E	Federally and State Endangered
T	Federally and State Threatened
SC	Federal Species of Concern (Former C2 Candidates, list no longer maintained by USFWS)
CS	Statewide Closed Season
SS2	State Special Concern Category II
G3	Rare globally
S3	Rare and local in Oklahoma (may be locally abundant)

*Federally listed endangered or threatened species are automatically included on Oklahoma's state list in the same category

<u>Habitat Codes</u>		<u>Range Codes</u>		<u>Presence Codes</u>	
S	Suitable	H	Historic	UN	Unlikely
M	Marginal	C	Current	PO	Possible
U	Unsuitable	Mi	Migratory	V	Verified (in the immediate vicinity of the Proposed Action)
		P	Periphery		

Notes:

¹Loggerhead shrikes have been documented on Tinker AFB. It is unknown whether the migrant race occurs (Tinker AFB 2007a).

All species listed by USFWS 2002 as occurring in Oklahoma County were included in table.

State sensitive species include those species that have been documented on Tinker AFB according to Tinker AFB 2007a.

3.5 Transportation and Circulation

3.5.1 Definition of Resource

Transportation and circulation refer to the movement of vehicles throughout a road and highway network. Primary roads are principal arterials, such as major interstates, designed to move traffic and not necessarily to provide access to all adjacent areas. Secondary roads are arterials such as rural routes and major surface streets which provide access to residential and commercial areas, hospitals, and schools.

3.5.2 Existing Conditions

3.5.2.1 Regional and Local Circulation

Tinker AFB is located within the city limits of Oklahoma City, approximately nine miles, by surface roads, southeast of downtown. Oklahoma City is served by a network of interstates and local and regional arterial roads. Four interstates, I-40, I-35, I-240, and I-44, pass through Oklahoma City and provide regional access to the base.

Three arterial roads, including Sooner Road, Southeast 29th Street, and Douglas Boulevard, and two interstates, I-40 and I-240, provide local access to Tinker AFB. Sooner Road is a north-south, four-lane arterial that forms part of the western border of the base. Southeast 29th Street is an east-west arterial that – together with I-40 – forms the northern boundary of the base. Douglas Boulevard is a four-lane, north-south arterial that forms the eastern boundary of the base and provides access to the base through the Lancer Gate. I-40 runs along the northern boundary of the base and provides access to the base via Air Depot Boulevard/Tinker Gate and Eaker Gate. Interstate-240, an east-west principal arterial located south of the base, provides access to the base by Sooner Road, Air Depot Boulevard (Gott Gate), and Douglas Boulevard.

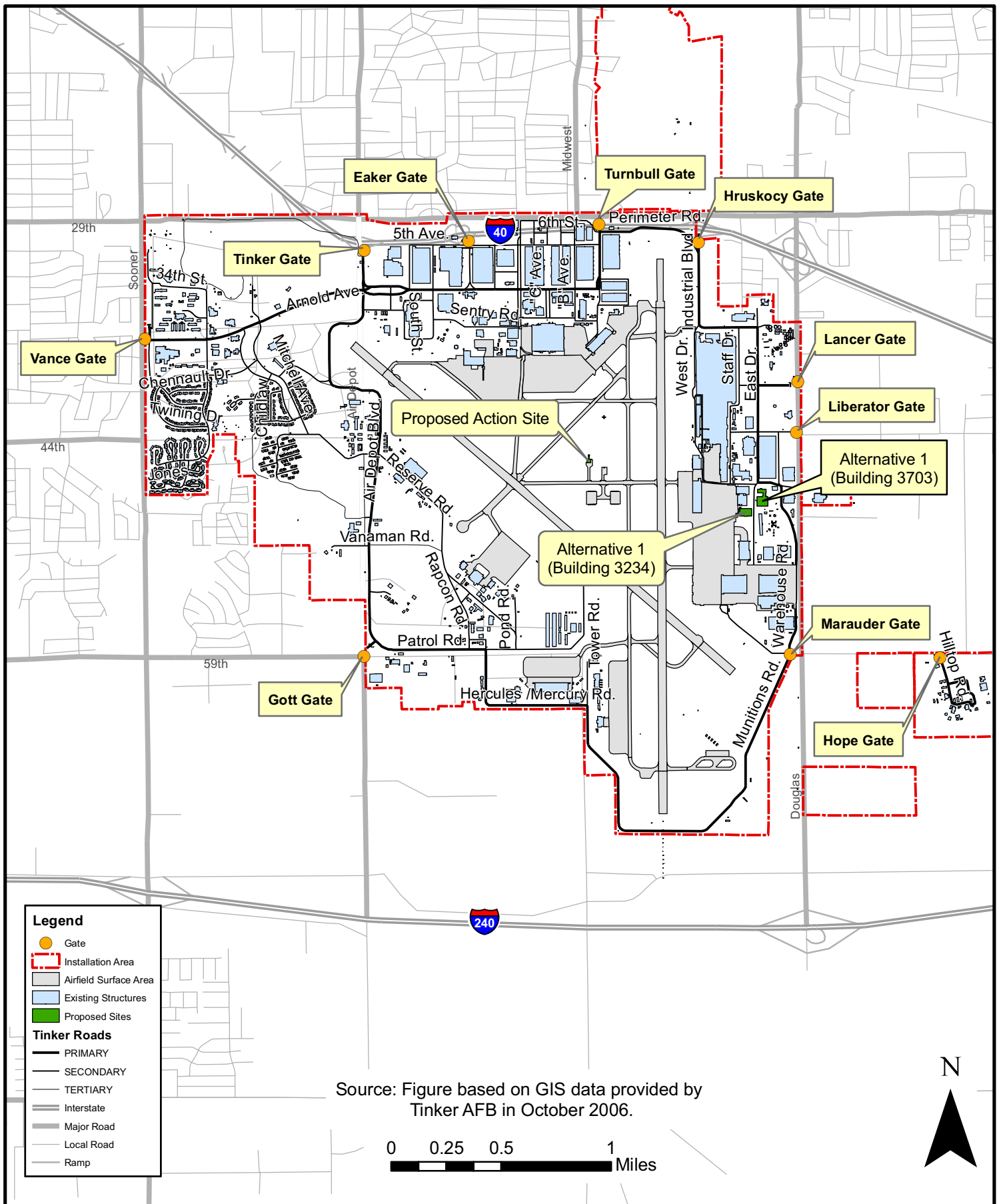
3.5.2.2 Tinker AFB and at the Proposed Project Location

Circulation

A network of arterial, collector, and local roads serves Tinker AFB. A system of local roads supports the majority of the traffic at the base. Air Depot Boulevard, East Drive, Arnold Avenue, and Patrol Road are the major arterial roads. A network of primarily two-lane collector roads provides access to facilities on the base and to the arterial network. McNarney Avenue, Reserve Road, and Mitchell Avenue are the primary collector roads.

Ten gates are located on the perimeter of Tinker AFB (Tinker AFB 2005) (Figure 3-4). Eaker Gate (Gate #2) and Lancer Gate (Gate #20) are open 24 hours per day, seven days per week. The remaining gates are open at various times to accommodate peak flow; these gates and their associated base access routes include the following:

- Tinker Gate, via Southeast 29th Street and Air Depot Boulevard;
- Eaker Gate (Gate #2), via Southeast 29th Street and F Avenue,
- Gott Gate (Gate #34), via Air Depot Boulevard,
- Vance Gate (Gate #40), via Sooner Road and Arnold Street,
- Hope Gate (38 EIG), via Southeast 59th Street,
- Turnbull Gate (Gate #3) at A Avenue and Southeast 29th Street,
- Hruskocy Gate (Gate #7), via Perimeter Road and Industrial Boulevard,
- Liberator Gate (Gate #21) Entrance Road A and Douglas Boulevard, and
- Marauder Gate (Gate #29) at Southeast 59th Street and Douglas Boulevard.



Access to the Proposed Action site is by a limited access road through a locked gate from Tower Road, via Patrol Road. Gott gate controls access to the southwest portion of the base. Access to Alternative 1 would be provided by East Drive via Turbine Drive. Access is limited to the base on the east side by three gates; Lancer Gate, Liberator Gate, and Marauder Gate (Figure 3-5).

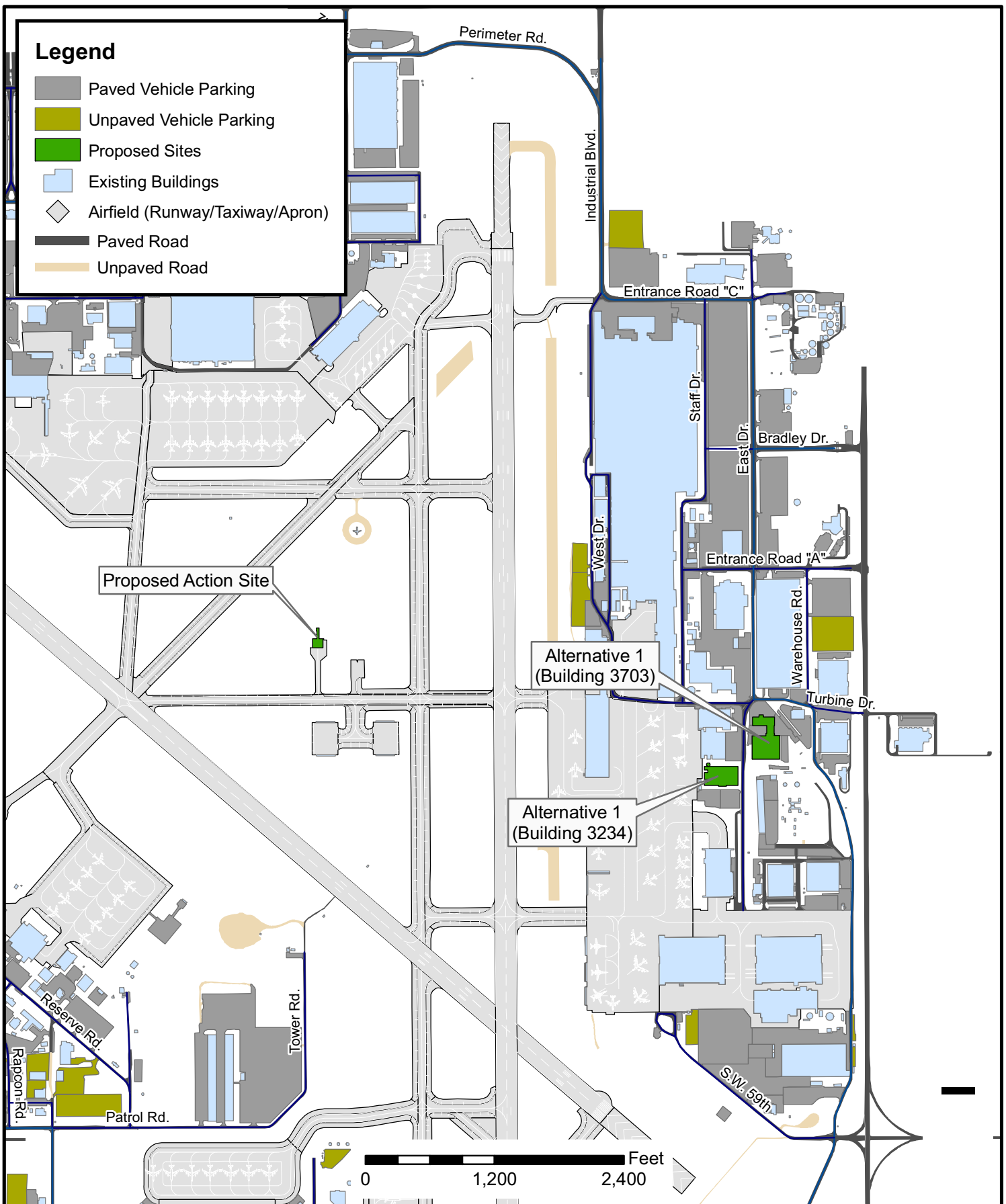
3.6 Hazardous Materials and Wastes

3.6.1 Definition of Resource

Hazardous materials are defined as substances with strong physical properties of ignitability, corrosivity, reactivity, or toxicity that may cause an increase in mortality, a serious irreversible illness, incapacitating reversible illness, or pose a substantial threat to human health or the environment. Hazardous wastes are defined as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health or the environment.

Issues associated with hazardous materials and wastes typically center around underground storage tanks (USTs); ASTs; and the storage, transport, and use of pesticides, bulk fuel, and petroleum, oils, and lubricants (POLs). When such resources are improperly used they can threaten the health and well-being of wildlife species, botanical habitats, soil systems, water resources, and people.

To protect habitats and people from inadvertent and potentially harmful releases of hazardous substances, DoD has dictated that all facilities develop and implement *Hazardous Waste Management Plans* or *Spill Prevention and Response Plans*. Also, DoD has developed the Environmental Restoration Program (ERP), intended to facilitate thorough investigation and cleanup of contaminated sites located at military installations. These plans and programs, in addition to established legislation (e.g., CERCLA and Resource Conservation and Recovery Act [RCRA]) effectively form the “safety net” intended to protect the ecosystems on which most living organisms depend.



3.6.2 Existing Conditions

3.6.2.1 Hazardous Materials

A large amount of hazardous materials are utilized to perform the mission of Tinker AFB. The Hazardous Materials Management Program (HMMP) manages the procurement and use of hazardous materials at the base. The HMMP functions through the Hazardous Materials Pharmacy, which consists of a decentralized Hazardous Material Pharmacy Cell and a Hazardous Materials electronic tracking system, the Hazardous Materials Management System (HMMS).

The HMMS database management system performs the following automated functions:

- Tracks training, exposure, inventory, and personal protective equipment.
- Dispenses hazardous materials according to units of use.
- Serves as central issue point for Just-In-Time control and issue.
- Creates on-line Material Safety Data Sheets (MSDS).
- Maintains hazardous materials control by authorized user, zone, and task.

The tracking system provides the data necessary to meet reporting requirements, assess processes for pollution prevention opportunities, and measure success in minimizing hazardous materials usage (Tinker AFB 2006a). Tinker AFB's OC-ALC Plan 19-2 Spill Prevention and Emergency Response Plan for Hazardous and Extremely Hazardous Material and Spill Prevention and Control and Counter Measures Plan (Tinker AFB 2004) presents specific measures for preparing for and responding to inadvertent discharges of oil or releases of hazardous substances.

3.6.2.2 Hazardous Waste Generation and Accumulation

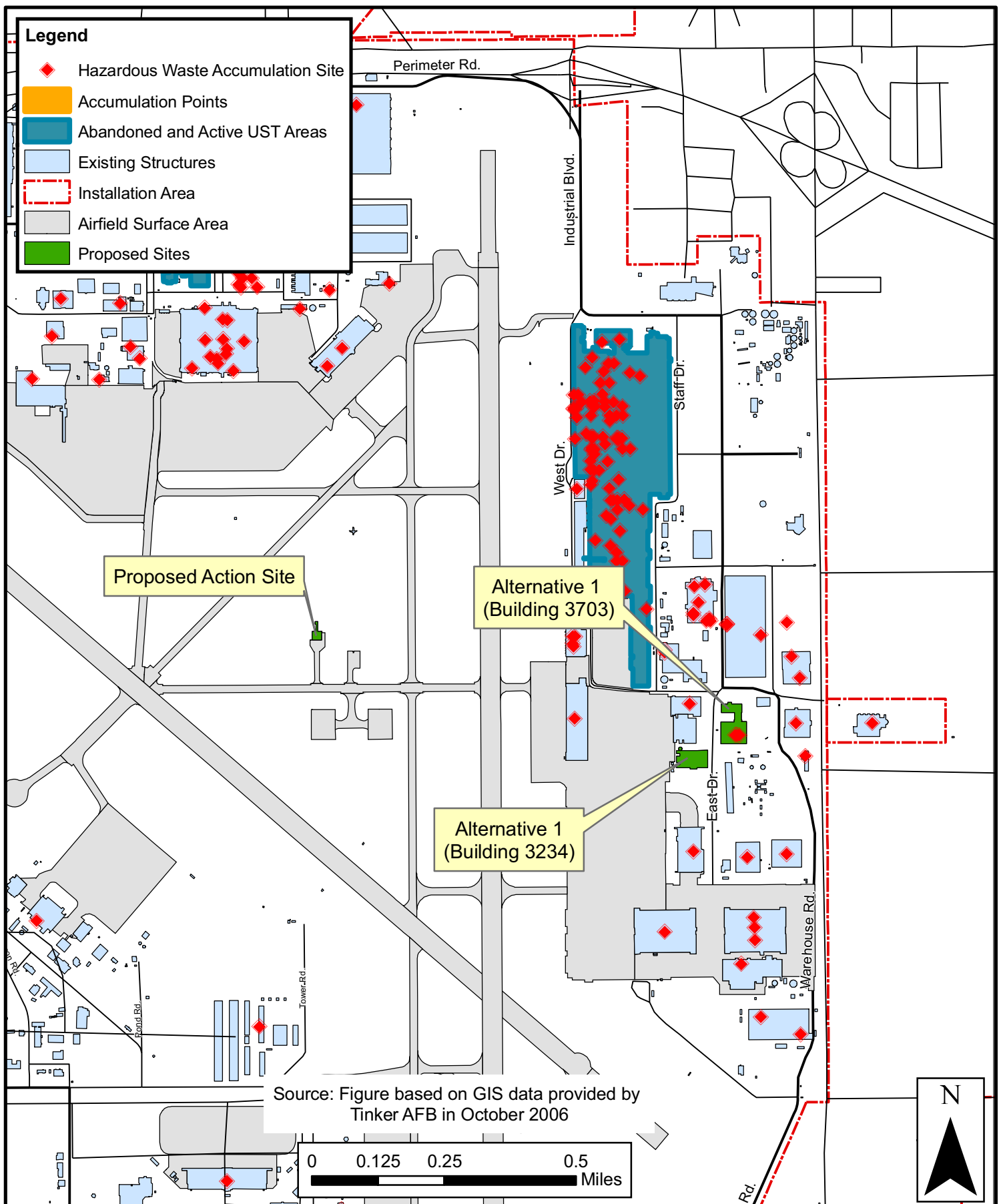
Tinker AFB is permitted under RCRA as a Large Quantity Generator (LQG) and a Treatment, Storage and Disposal Facility (TSDF) of hazardous waste. The RCRA permit (number OK 1571724391) was issued to Tinker AFB in August 2002 by DEQ, the primary oversight agency for RCRA compliance in Oklahoma (Tinker AFB 2006a). Hazardous wastes at the base are managed in accordance with the most recent Hazardous Waste Management Instruction guidelines (Tinker Air Force Base Instruction [TAFBI] 32-7004). Compliance with the provisions, regulations, and mandates put forth in TAFBI 32-7004 is mandatory for actions relating to hazardous waste on the installation. The purpose of the guidelines is to ensure safe and effective collection, handling, and disposal of hazardous waste on the installation in a manner that complies with applicable DoD, Air Force, federal, and state laws and regulations (Tinker AFB 2005). Specific procedures for preparing for and responding to inadvertent discharges of oil or releases of hazardous substances at the base is provided in Tinker AFB's Spill Prevention and Emergency Response Plan for Hazardous and Extremely Hazardous Material and Spill Prevention Control and Countermeasures Plan (Tinker AFB 2004).

The largest amount of hazardous waste at the base is generated by aircraft and jet engine maintenance and overhaul activities. These activities include:

- Preparation of aircraft skins and structural members,
- Paint removal and application, degreasing, metal etching and carbon removal of engines, and
- Abrasive blasting.

Conducting these activities requires the use of large amounts of solvents and the generation of dust and liquid wastes. Other hazardous wastes contributing to this waste stream includes petroleum products and waste, hydraulic fluid, and anti-freeze. An existing underground oil/water separator is utilized for hush house operations and contributes to this waste stream.

Another large hazardous waste stream generated at Tinker results from RCRA corrective actions on past-contaminated sites, and remediation of a National Priorities List (NPL) site on the base. These wastes consist of solvent, hydrocarbon, and metal-contaminated soil and debris removed during remediation projects (e.g., halon fire suppression systems). According to the Tinker AFB hazardous waste records, approximately 1416 tons of hazardous waste were generated at Tinker AFB in 2007 (Tinker AFB 2007d). A total of 1200 hazardous waste collection areas are located throughout the base (Tinker AFB 2008a). Hazardous Waste Accumulation Sites in the vicinity of the Proposed Action Site and Alternative 1 are presented in Figure 3-6. Waste containers from the IAPs are brought to three centralized Accumulation Points (APs), which include Buildings 809 and 3125. Building 809 is the largest of the APs and processes the majority of containerized hazardous waste from the IAPs for transfer to the TSDF. The TSDF is located in Building 810 and is operated by the Defense Reutilization and Marketing Office (DRMO). The role of the TSDF is limited to conforming storage (Tinker AFB 2006a). Building 810 temporarily houses hazardous waste for a period up to one year (Tinker AFB 2005). Serialized accumulation containers for non-bulk hazardous waste are issued to waste generators and picked up when full (Tinker AFB 2006a). Profiling is completed using either generator knowledge or laboratory analysis to identify and quantify the chemical constituents of the waste for proper treatment and disposal. Containers are then shipped offsite for disposal at least weekly under a 21-day lifecycle at the TSDF. Bulk shipments of hazardous wastewater, fuels, treatment sludge, process tank solutions and contaminated soils are shipped directly from the point of generation to an offsite disposal facility.



EA

Hazardous Waste Accumulation Sites T-10 Hush House Tinker Air Force Base

FIGURE

3-6

3.6.2.3 Fuel Storage

The fuels and materials stored and handled in bulk at the base include JP-5, JP-8 (aviation fuel), JP-10 (missile fuel), Mogas (automotive gasoline), PF-1, diesel fuel, biodiesel fuel, calibration fluid and de-icing fluid. Conoco supplies JP-8 fuel to Tinker AFB through a 6-inch supply line that enters the northern section of the base and continues to the main tank farm (Tinker AFB 2005). Tanker trucks are used as a backup to deliver JP-8, which is dispensed to aircraft either from eleven R-11 refuelers or directly through hydrants on the aprons on the west, south, and east sides of the base. An estimated 54 percent of aircraft refueling is done through hydrants and the remaining 46 percent is by trucks. Approximately 50 percent of defueling is done by hydrants and approximately 50 percent is by trucks (Tinker AFB 2006a).

Various fuels at the base are also stored in ASTs and USTs. Releases from ASTs and USTs (i.e., spills, overfill, and leaks) can cause fires or explosions that threaten human safety and can contaminate soil and groundwater that threaten human health. The main goal of the base's storage tank program is to protect groundwater and soil from contamination by ensuring that:

- all ASTs meet all applicable requirements including requirements for leak testing and preventing, responding to, reporting, and cleaning up spills;
- new USTs (including piping) are designed and constructed to provide the following: corrosion protection, release detection, spill and overfill prevention, proper installation, and secondary containment; and
- all existing USTs (any regulated UST installed before 22 December 1988) are upgraded to meet the standards for new USTs (Tinker AFB 2005).

An aggressive investigation of abandoned and active USTs at Tinker AFB began in September 1985. Eighty-eight active tanks and 38 abandoned tanks were identified and located. Most of those tanks were found in the vicinity of Building 3001 and in the north central portion of the base near B201, B210 and the B290 Fuel Farm.

As of 31 July 1999, 26 sites were established with the OCC to investigate releases from USTs. Tinker AFB has completed the majority of the investigations for determining the nature and extent of contamination at each UST site; several of those sites are in active remediation. Currently, fifteen of the activated sites have been closed or deactivated in accordance with OCC regulations that were in effect prior to 1 September 1996. These previous rules used a system that categorized UST sites for remediation based on generic contaminant levels in soils and groundwater. On 1 July 1996, the OCC issued new rules that classify sites for remediation based on risk to human health and the environment. The process is referred to as the Oklahoma Risk-Based Corrective Action (ORBCA) Program. Eleven sites are still open and are in remediation or have been recommended for case closure. In addition, two UST removals were performed in 1998, and tank closure reports were submitted to the OCC in December 1998 for each site. According to the ECAMP FY 2006 Final Report, Tinker AFB currently maintains 36 active USTs and 90 active ASTs (Tinker AFB 2006a).

No USTs or ASTs are known to have been installed at the Proposed Action Site. However two ASTs are located at the Alternative 1 Site: one 400,000 gallon tank and one 200,000 gallon tank.

3.6.2.4 Environmental Restoration Program

The Secretary of Defense established the Defense Installation Restoration Program (IRP) (present-day ERP) in 1981 to investigate and remediate hazardous waste sites at DoD facilities. The USAF subsequently established its IRP to locate and investigate hazardous waste sites on its installations. The IRP execution strategy is to protect human health and the environment, satisfy legal agreements and have all sites closed or remedies in place by the end of FY 2008 (Tinker AFB 2005). Fully restored and remediated IRP sites present few constraints to future on-base development; however, the implementation of land use controls (LUCs) may be required. LUCs are physical, legal, or administrative mechanisms that restrict or limit access to contaminated property to promote beneficial land uses and to protect human health and the environment.

Tinker AFB began its IRP in 1980 with the completion of a Preliminary Assessment (PA) of 14 sites. Various base-wide surveys (i.e., underground storage tank and water quality surveys) identified other potential IRP sites and additional PAs were conducted for these sites. A total of 40 IRP sites including landfills, fire training pits, radioactive waste disposal sites, fuel storage areas, industrial waste pits, and the IWTP have been identified at Tinker AFB since the beginning of the IRP (Tinker AFB 2005). A total of 23 of the IRP sites are addressed under RCRA guidance and four are addressed under CERCLA as operable units on the NPL. Numerous remedial investigations/feasibility studies (RI/FS), RCRA facility investigations (RFI), corrective measure studies (CMS), and interim response actions have been conducted at various sites on the base. Seventeen of the 40 sites have been closed, and no further action is required.

No IRP sites are located in the vicinity of the Proposed Action site or Alternative 1 site.

3.7 Safety

3.7.1 Definition of Resource

The primary safety concern with regard to military aircraft activity is the potential for aircraft mishaps (i.e., crashes), which may be caused by mid-air collisions with other aircraft or objects, weather difficulties, or on-ground collisions between aircraft.

3.7.2 Existing Conditions

3.7.2.1 Runway Protection Zones

Accident Potential Zones (APZs) and Clear Zones (CZs) are rectangular zones extending outward from the ends of active military airfields that delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during takeoff or landing. The CZs and APZs for Runways 17/35 and 12/30 at Tinker AFB are depicted in Figure 3-7. Each end of Runway 17/35 at Tinker AFB has a 3,000 foot by 3,000 foot CZ and two APZs, while each end of Runway 12/30 has a 3,000 foot by 3,000 foot CZ and single 3,000 foot wide by 5,000 foot-long APZ (Tinker AFB 2006b). Neither the Proposed Action site nor the site proposed for Alternative 1 is located in either APZs or CZs (Figure 3-7). However, they are located within the limited access zone. Both sites are located more than 250 feet from the center line of the runway.

Clear Zones

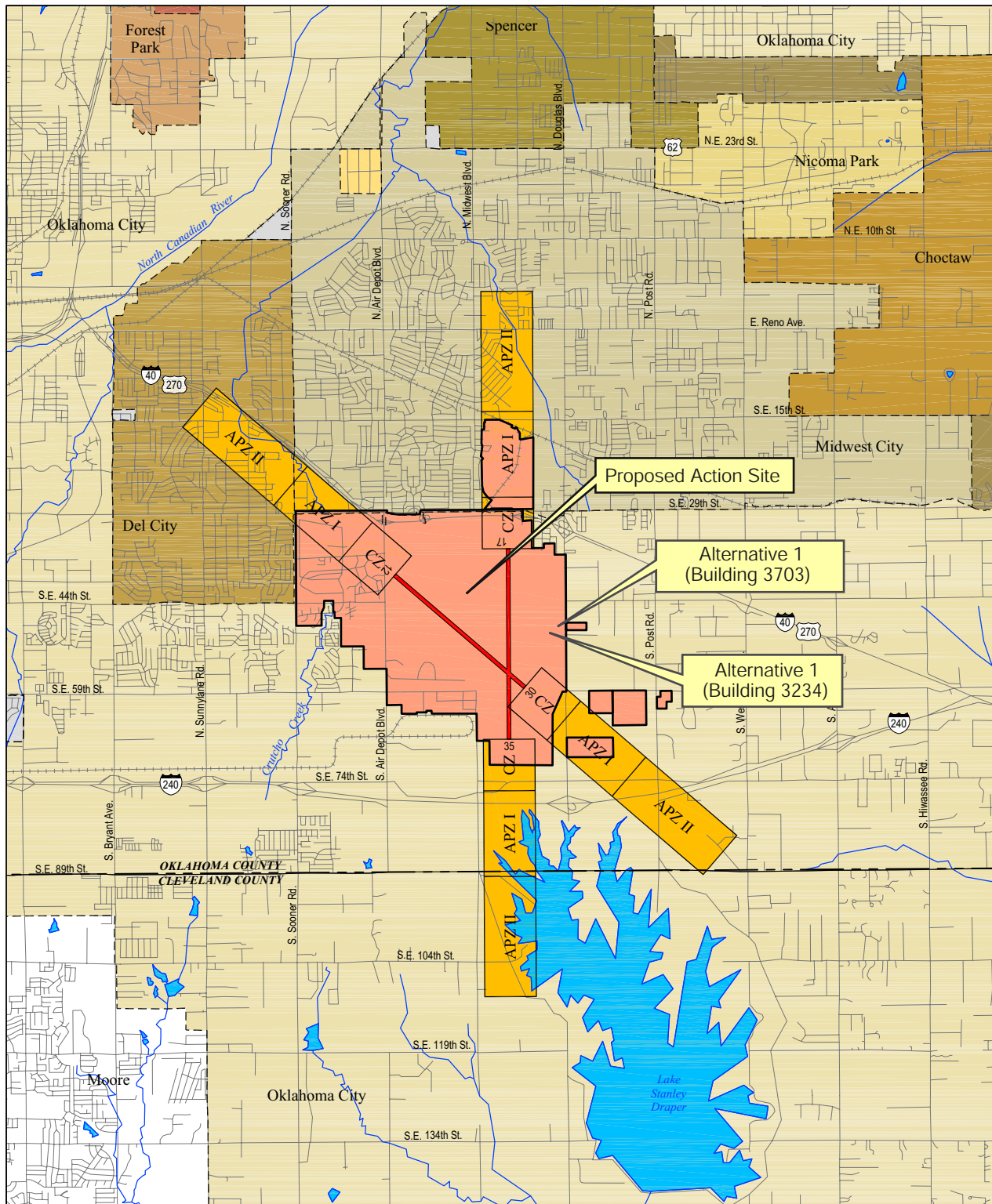
The CZ has the highest accident potential of the three zones, as 27 percent of accidents studied occurred in this area. As stated previously, it is USAF policy to request that Congress authorize and appropriate funds to purchase the real property interests in this area to prevent incompatible land uses. Currently at Tinker AFB, all land use with CZs would be considered compatible (Tinker AFB 2006b).

Accident Potential Zones I and II

APZ I is an area that possesses somewhat less accident potential than the CZ, with 10 percent of the accidents studied occurring in this zone. APZ II has less accident potential than APZ I, with 6 percent of the accidents studied occurring in this zone. While the potential for aircraft accidents in APZs I and II does not warrant land acquisition by the USAF, land-use planning and controls are strongly encouraged in these areas for the protection of the public (Tinker AFB 2006b).

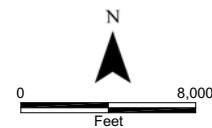
APZ I is 3,000 ft wide by 5,000 ft and has land use compatibility guidelines that are sufficiently flexible to allow reasonable economic use of the land, such as industrial/manufacturing, transportation, communication/utilities, wholesale trade, open space, recreation, and agriculture. APZ II, also 3,000 ft wide, is 7,000 ft long extending to 15,000 ft from the runway threshold. Acceptable uses include those of APZ I, as well as low density single family residential and those personal and business services and commercial/retail trade uses of low intensity or scale of operation. High density functions such as multi-story buildings, places of assembly (e.g., theaters, churches, schools, restaurants, etc.), and high density office uses are not considered appropriate (Tinker AFB 2006b).

Incompatible land use is currently established within APZs associated with the airfield at Tinker AFB and is summarized in Table 3-6. APZs I and II located off Runways 17 and 12 contain commercial and sensitive receptors (i.e., residences, schools, libraries, etc.), respectively.



LEGEND

Runway	CZ Clear Zone
Roadway	APZ Accident Potential Zone
City Limits	
Tinker AFB	



Source: Tinker AFB 2006a

EA

Clear Zones and Accident Potential Zones T-10 Hush House Tinker Air Force Base

FIGURE

3-7

**Table 3-6. Acres of Incompatible Land Use within Clear Zones,
Accident Potential Zones I and II Associated with Runways 12/30 and 17/35**

Land Use	Acres of Incompatible Land Use		
	CZ	APZ I	APZ II
Residential	0	4	408
Commercial	0	41	0
Industrial	0	0	0
Public/Quasi-public	0	4	121
Recreational/Open Space/Agricultural/Low Density	0	0	0
Total	0	49	529

Source: Tinker AFB 2006b.

3.7.2.2 Fire Safety

Currently a halon fire suppression system is installed in Building 926. Halon fire suppression systems utilize a gaseous agent (halon) that interrupts the chemical reaction that occurs when fuels burn. Because of their strong ozone depletion potential, the Montreal Protocol required the earliest production and import phaseout of halons in the US in 1994 (EPA 2008). Use of the halon fire suppression system will be done in accordance with the USAF policy on the Use of Ozone Depleting Substances (USAF 1993).

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SECTION 4 ENVIRONMENTAL CONSEQUENCES

This section evaluates the potential environmental consequences resulting from implementation of the Proposed Action and alternatives. Analyses are presented by resource area, as presented in *Section 3, Affected Environment*.

4.1 Air Quality

4.1.1 Approach to Analysis

The 1990 Amendments to the CAA require that Federal agency activities conform to the SIP with respect to achieving and maintaining attainment of NAAQS and addressing air quality impacts. The EPA General Conformity Rule requires that a conformity analysis be performed which demonstrates that a Proposed Action does not: 1) cause or contribute to any new violation of any NAAQS in the area; 2) interfere with provisions in the SIP for maintenance or attainment of any NAAQS; 3) increase the frequency or severity of any existing violation of any NAAQS; or 4) delay timely attainment of any NAAQS, any interim emission reduction, goals, or other milestones included in the SIP for air quality. A conformity review must be performed when a Federal action generates air pollutants in a region that has been designated a *nonattainment* or *maintenance* area for one or more NAAQS. *Nonattainment areas* are geographic regions where the air quality fails to meet the NAAQS. *Maintenance* areas are regions where NAAQS were exceeded in the past, and are subject to restrictions specified in a SIP-approved maintenance plan to preserve and maintain the newly regained attainment status. Provisions in the General Conformity Rule allow for exemptions from performing a conformity determination if the total net increase in emissions of individual nonattainment or maintenance area pollutants resulting from implementation of the Proposed Action fall below the significant (*de minimis*) threshold values.

4.1.2 Impacts

4.1.2.1 Proposed Action

Pollutant emissions associated with implementation of the Proposed Action at Tinker AFB would include combustion emissions from vehicles and heavy-duty equipment used during refurbishment of the hush house. These emissions would be temporary and would not occur beyond completion of refurbishment activities. Oklahoma County is in an Early Action Compact Agreement with EPA for the 8-hour ozone standard and is designated as an *attainment* area in compliance with all NAAQS.

Construction Emissions

Dust Emissions

Under implementation of the Proposed Action, dust (i.e., PM₁₀, a criteria pollutant) would be generated during some of the refurbishment activities. Dust emissions can vary substantially daily depending on levels of activity, specific operations, and prevailing meteorological conditions. Based on similar studies at other facilities the expected emission rate is 1.2 tons of dust generated per acre per month of activity. The Proposed Action would include the refurbishment of Building 926 and would not involve site preparation activities (i.e., grading). Further, there are no air emission limit or *de minimis* levels for dust emissions generated during construction projects in Oklahoma. Long-term emissions from developed facilities would be negligible.

Combustion Emissions

Combustion emissions associated with construction-related vehicles and equipment would be minimal because most vehicles would be driven to and kept at the affected site for the duration of construction activities. Further, as is the case with PM₁₀ emissions associated with site preparation activities, emissions generated by construction equipment would be temporary and short-term.

Operational Emissions

Implementation of the Proposed Action would result in an increase in emissions due to the increased capacity to test aircraft engines at Tinker AFB. The majority of the long-term operational emissions associated with the Proposed Action would be emissions from the fuel component testing operations. Negligible additions to personnel would occur as a result of the Proposed Action; therefore, negligible combustion emissions related to personnel transportation would result.

In anticipation of expanded aircraft engine testing workload, in April 2007 Tinker obtained a PSD permit authorizing the emission increases outlined in Table 4-1. As part of the PSD air permitting process for this proposed hush house, air quality impacts from the base with the proposed action implemented were analyzed. The estimated increase in emissions from the proposed action and all other anticipated increases in engine testing are summarized in Table 4-1. This table is based on information from the PSD air permit application that used a maximum-use case scenario of 1,100 engine tests per year to allow Tinker AFB adequate future capacity and to maintain consistency with the air permit.

Table 4-1. Estimated Increases in Emissions at Tinker AFB*

Pollutant	Emissions Increase due to Proposed Action (tons/yr)
CO	169.39
NO _x	323.13
VOC	135.46
PM ₁₀	27.66
SO _x	34.39

* This table is based on information from the PSD air permit application that used a maximum use case scenario of 1,100 engine tests per year to allow Tinker AFB adequate future capacity and to maintain consistency with the air permit. The T-10 hush house would constitute only a portion of the emissions shown in the table (i.e., likely less than 30%). The remainder of the emissions would result from engine testing at other facilities within Tinker AFB.

All estimated pollutant emissions from the proposed action except SO_x were above the PSD significance threshold; therefore, impacts from these pollutants were analyzed. The AMS/EPA Regulatory Model (AERMOD) dispersion model was applied as part of the PSD application. Results showed the maximum modeled concentrations of CO, NO₂, and PM₁₀ beyond the facility fence line were significantly below both the primary and secondary NAAQS (Table 4-2). Since the estimated offsite concentrations were below the NAAQS no impact to human health or the environment is anticipated.

Table 4-2. Estimated Off-site Concentrations of Air Pollutants

Pollutant	Averaging Period	Max. Modeled Concentration (µg/m³)	Primary NAAQS (µg/m³)	Secondary NAAQS (µg/m³)
CO	1-hour	41.08	40,000	None
	8-hour	21.24	10,000	None
NO ₂	Annual	0.31	100	100
PM ₁₀	24-hour	1.27	150	150
PM _{2.5}	24-hour	Not modeled	35	35
	Annual	Not modeled	15	15

VOCs do not have a NAAQS. However, VOCs interact with NO_x in the presence of sunlight to form ozone which does have a NAAQS. As of March 2008, EPA issued the final rule for 8-hour O₃, revising both the primary and secondary standard to 0.075 ppm. The standard is attained when the computed 3-year average of the annual 4th highest daily maximum 8-hour average does not exceed 0.08 ppm. The EPA has not provided guidance to show compliance with the 8-hour ozone standard for individual facilities subject to PSD based on VOC emission increases. EPA has provided guidance to states for modeling using the early action compact (EAC) model to show state-wide compliance. This modeling demonstrated that Oklahoma is in compliance state-wide. The state has the option of running the model after adding large emission sources to the model to indicate continued compliance. The proposed increase in VOC emissions is not expected to cause additional exceedances of the ozone NAAQS.

The proposed facility would increase the engine testing capacity of Tinker AFB. Tinker AFB has already acquired a PSD permit for the potential engine testing workload increase. The permit (permit number 99-104-C [M-4]) was issued by ODEQ on April 25, 2007. One permit requirement is to utilize best available control technologies (BACT) to control emissions. The initial BACT analysis conducted by Tinker AFB concluded that retrofitting the facility with control devices was not technically or economically feasible due to the lack of available technologies or high economic costs (Tinker AFB Memorandum 2007c).

4.1.2.2 Alternative 1: Refurbish Buildings 3703 and 3234

If Alternative 1 is selected, emissions from testing would be slightly lower than the Proposed Action, because the F100-229 engine could not be accommodated, while it would be tested under the Proposed Action. Under Alternative 1, other existing test facilities at the base would likely absorb the additional workload by the addition of second and/or third shifts. Therefore, an increase in operations emissions and impacts would likely occur regardless of the construction, and an increase in nighttime operations when inversions are likely may degrade air quality more than the build case. Due to the low impacts determined from analysis of the Proposed Action, the impacts from Alternative 1 are expected to be similar to the Proposed Action.

4.1.2.3 Alternative 2: No-Action Alternative

If the No-Action Alternative is selected, the new hush house would not be constructed and air quality conditions would remain unchanged from their current status, as described in Section 3.1, *Air Quality*. Selection of the No-Action Alternative would not impact regional or local air quality conditions.

4.2 Noise and Vibration

4.2.1 Approach to Analysis

Noise and vibration impact analyses typically evaluate potential changes to existing conditions that could result from implementation of a Proposed Action. Potential changes may be beneficial if they reduce the number of sensitive receptors exposed to unacceptable noise or vibration levels. Conversely, changes may be detrimental if they result in increased exposure to unacceptable noise and vibration levels. An increase in noise and vibration levels due to introduction of a new noise source can create an impact on the surrounding environment to both persons and structures on- and off-base.

The human reaction to various levels of noise and vibration is highly subjective, and varies from person to person. Specific vibration levels have the potential to damage structures; however, damage is dependent on numerous factors including vibration level, structure construction, duration of exposure, etc.

The NOISEMAP 7.3 noise model was used to estimate on- and off-base noise levels associated with implementation of the Proposed Action. Proposed T-10 hush house operations were combined with baseline operations to determine projected on- and off-base noise levels. Analysis of noise level impacts on operators of the T-10 hush house were based on previous noise study results at Elmendorf AFB using the loudest engine that would be tested.

Vibration levels associated with proposed T-10 hush house operations were determined using previous T-10 hush house studies and steady-state vibration principals.

4.2.2 Impacts

4.2.2.1 Proposed Action

T-10 Hush House Noise

The proposed T-10 hush house operations would result in an increased number of engine test operations at Tinker AFB. Building 926 (the T-10 hush house) is currently used for storage and is not operational. The engine testing would be conducted in compliance with Airfield Hours of Operations and Quiet Hours outlined in the AICUZ and Tinker AFI 13-201. Implementation of the Proposed Action would return the building to operational status, resulting in approximately 1.59 engine tests per day and 413 tests annually. The daily number of proposed engine tests, by engine type, is presented in Table 4-3.

Table 4-3. Proposed Annual and Daily Engine Test Runs

Engine Type	Annual Engine Runs	*Daily Engine Runs
F100-PW -220, -229	192	0.74
F101-GE-102	36	0.14
F110-GE-100, -129	146	0.56
TF-33-100, -102, -103	39	0.15
Total	413	1.59

*Based on 260 days annually
Source: Tinker AFB 2008b

The purpose of the hush house is to reduce the noise of engine testing, and therefore the noise produced during testing would be less than that of a non-suppressed engine (e.g., engines in aircraft during departure). Sound levels associated with the hush house are a result of the noise suppression capability, limited number of daily engine tests, power settings, and time at power settings.

Currently, noise exposure of 65 L_{dn} or higher associated with total military aircraft operations at Tinker AFB affects approximately 5,573 acres beyond the base boundary. Implementation of the Proposed Action would produce L_{dn} levels (65 L_{dn} within 250 feet of hush house) less than this location currently experiences (73 L_{dn}) with daily aircraft operations; therefore, not contributing to an increase in the overall noise exposure. Thus, on- and off-base areas affected by noise levels of 65 L_{dn} or greater would not increase upon implementation of the Proposed Action.

Proposed Action sound levels would be indistinguishable from sound levels associated with current aircraft operations and are not predicted to exceed baseline sound levels described in *Section 3.2, Noise*.

According to the USAF, a significant noise impact would occur if analysis shows that the Proposed Action would cause noise-sensitive areas to experience increased noise exposure to unacceptable levels. Implementation of the Proposed Action would not result in any sensitive receptors (e.g., residences, schools, etc.) currently within the baseline 65+ L_{dn} contour to experience an increase in sound levels. Further, on-base receptors would not experience an increase in sound levels; therefore, the Proposed Action would not result in a noise impact to the surrounding community and on-base receptors at Tinker AFB.

Established criteria for noise associated with a T-10 hush house suggest that sound levels should not exceed 89 dBA anywhere beyond a 250-foot radius, which is sufficient to alleviate any health concerns related to audible noise (Oak Ridge National Laboratory no date). Given that this separation criterion is a USAF requirement and the air traffic control tower (the facility located nearest Building 926) is approximately 400 feet (ft) from the engine test stand within the hush house, sound levels from proposed operations would be negligible for those who work within or operations associated with the air traffic control tower.

Regarding operators of the T-10 hush house, when conducting engines runs at or above military power, operators would utilize E-A-R plugs or David Clark H10-76 Communication Headsets within the C-Cab and a combination of the two devices when next to the engine (Department of the Air Force 2007). Further, in addition to the utilizing the two protective devices concurrently, when standing next to this type of engine during military and max power, time should be limited to 15 and 1.5 minutes, respectively (Department of the Air Force 2007). Therefore, with implementation of these safety measures, noise impacts to individuals conducting engine runs within the T-10 hush house would not be significant.

T-10 Hush House Vibration

A significant impact from vibration would occur if analysis determined that the Proposed Action would cause persons or structures in on- or off-base areas to experience unacceptable vibration levels. Unacceptable vibrations levels could result in annoyance to persons and damage to structures.

An acceleration (g) of 0.01 is recommended as a threshold for structural impacts as long-term structural damage may occur for wall accelerations greater than 0.01 g (Bolz and Tuve 1976; Witten 1987). One study at Langley AFB of a F100-PW-100 engine operating at maximum power (afterburner) within a T-10 hush house resulted in an acceleration of approximately 0.002 to 0.005 g at 10 to 15 hertz (Hz) and a distance of 400 ft from the rear of the hush house (i.e., in the direction of the engine exhaust) (Goerke et al 1990). Given these values and incorporating steady-state vibration principals, a displacement of approximately 0.0002 inches and peak particle velocity (PPV) of 0.012 to 0.021 inches/second would be expected. A PPV of 0.012 to

0.021 inches/second is below Maximum Allowable Ground Motion at Structures from Blasting Activities and “Slightly Perceptible” according to the American National Standards Institute (ANSI) Allowable Continuous/Intermittent Vibration Levels from 7:00 AM to 10:00 PM (ANSI 1983). The structure closest to Building 926 would be the proposed air traffic control tower, located approximately 400 ft east of both the engine test stand within the hush house and end of the augments tube. The closest existing structure is Building 3105, which is approximately 2,495 ft away. Given the air traffic control tower location relative to the engine test stand within the hush house and the augments tube (90 degree angle), sound pressure levels would be anticipated to be reduced by approximately 10 percent below what would be experienced directly behind the engine test stand and augments tube (180 degrees) (Lee 1982). This would result in a further reduction in PPV than presented above. Also, afterburner use would occur for approximately 300 seconds per day, but afterburner use would not exceed a 5-second continuous period. Power settings below afterburner would occur more frequently but would result in a lower PPV (i.e., reduced vibrations) when compared to afterburner settings. Given the distance and angle of the air traffic control tower in relation to the location of Building 926, impacts associated with vibration levels would be negligible.

While vibration levels associated with engine tests at afterburner within the hush house would likely be slightly perceptible, it is unlikely that they would exceed current vibrations levels experienced within the air traffic control tower (i.e., those associated with afterburner departures of aircraft whose engines are not suppressed). No chronic or acute human health impacts would be expected to occur. Levels of vibration sufficient to cause human discomfort or annoyance may occur during engine testing in the afterburner mode; however, duration and frequency of these tests are typically 300 seconds, once per day but not for more than a 5-second continuous period (Oak Ridge National Laboratory 1993). Therefore, impacts to persons from vibrations associated with T-10 hush house operations would be negligible.

Construction-Related Noise

Implementation of the Proposed Action would have minor, temporary effects on the noise environment in the vicinity of the Building 926 during the hush house retrofit. Refurbishment activities would be conducted in compliance with Airfield Hours of Operations and Quiet Hours outlined in the AICUZ and Tinker AFI 13-201. Use of heavy equipment for the hush house retrofit would generate noise exposure similar to existing ambient levels at the base. Noise generation would be typical of construction activities, short-term, and occur during normal working hours (i.e., between 7:00 AM and 5:00 PM). Therefore, noise generated by T-10 hush house retrofitting activities associated with implementation of the Proposed Action would not impact sensitive receptors on or in the vicinity of Tinker AFB.

4.2.2.2 Alternative 1: Refurbish Building 3703

Implementation of Alternative 1 would involve refurbishing Building 3703 to accommodate the increased engine testing workload at Tinker AFB. Building 3703 is currently used as a repair and maintenance shop where engine testing is routine. Further, Building 3703 and surrounding

structures are currently subjected to noise and vibration levels associated with power settings at military power and higher. Under this alternative, single event noise and vibration levels would not increase as this building is already testing similar engines at similar power settings; however, the frequency of engine runs would increase. The engine testing and refurbishment would be conducted in compliance with Airfield Hours of Operations and Quiet Hours outlined in the AICUZ and Tinker AFI 13-201. Impacts from noise and vibration levels associated with the implementation of this alternative would be similar to the Proposed Action.

4.2.2.3 Alternative 2: No-Action Alternative

If the No-Action Alternative were selected, Tinker AFB would not implement the Proposed Action. Therefore, conditions would remain as described in *Section 3.2, Noise and Vibration* and no impacts would occur.

4.3 Water Resources

4.3.1 Approach to Analysis

Significance criteria for water resources impacts are based on water availability, quality, and use; existence of floodplains; and associated regulations. An impact to water resources would be significant if it would 1) reduce water availability to or interfere with the supply of existing users; 2) create or contribute to overdraft of groundwater basins or exceed safe annual yield of water supply sources; 3) adversely affect water quality or endanger public health by creating or worsening adverse health hazard conditions; 4) threaten or damage unique hydrologic characteristics; or 5) violate established laws or regulations that have been adopted to protect or manage water resources of an area including wetlands. Impacts of flood hazards on Proposed Actions are significant if such actions are proposed in areas with high probabilities of flooding.

4.3.2 Impacts

4.3.2.1 Proposed Action

Surface Water

The Proposed Action would involve renovation of Building 926 for the purpose of reactivating the facility as a T-10 hush house. Project activities would occur on an area that has been previously developed and no new ground-disturbing activities or creation of impermeable surfaces would happen; therefore, no increase in the potential for soil erosion during construction or increased stormwater flow during operations is expected to occur. Contaminants, such as petroleum hydrocarbons, in run-off from developed areas of the site, including industrial areas or parking lots, could impact water quality in the area once the site is reactivated. These impacts would be minimized assuming existing non-point pollution requirements are met and spill prevention and response procedures are implemented at the site. Further, implementation of

BMPs, (e.g., secondary containment around construction sites, etc.), would minimize this potential to negligible impacts during construction.

A separate plan, not associated with the Proposed Action, includes the construction of an administrative facility, including a restroom facility, on the airfield within the vicinity of the Hush House, which will be used by Hush House personnel. Until the permanent restroom facility is constructed, a temporary facility (portable restrooms) will be used for a period up to but not exceeding one year. The proponent organization would obtain permission for the temporary facility and would be responsible for submitting information on the location and use of the facility as well as best management practices to ensure that storm water is protected and Tinker AFB complies with National Pollutant Discharge Elimination System regulations.

A 2,500-gallon mobile fuel tank trailer would be stored in the containment area outside of Building 926 and connected via a three-inch line to support hush house operations. This tank would be properly registered with the OCC. The existing secondary containment for on-site fuel storage will be evaluated to verify that it meets all requirements to accommodate the 2,500-gallon fuel tank. Any required upgrades to the secondary containment would be completed prior to placement of a fuel tank outside the hush house. The existing underground oil/water separator at the facility would be inspected and reactivated in compliance with OAC 165:26 AST regulations by a certified OCC installer. Additionally, the oil/water separator will be added to the Oil/Water Separator maintenance List to ensure periodic pump out. Impacts to surface water resources would be less than significant.

Groundwater

The Proposed Action site does not overlie any known groundwater contamination. It is unlikely that groundwater quality would be affected by the renovation and reactivation of Building 926. Required controls on the handling of hazardous materials and spill prevention and cleanup would be implemented to protect groundwater. Finally, with regard to groundwater area below the region, the project site does not overlie an identified groundwater recharge zone of special significance and the footprint of facility currently exists as an impervious surface. Therefore, the Proposed Action would not have an adverse impact on groundwater resources.

Wetlands

Implementation of the Proposed Action would not eliminate, modify, or otherwise impact any existing wetlands on Tinker AFB. Therefore, implementation of the Proposed Action would not have an adverse impact on wetlands.

Floodplains

No 100-year or 500-year floodplains have been identified on the proposed project site. No changes would occur to the impervious surface area as a result of implementation of the proposed action; therefore, no impacts to floodplains would occur.

4.3.2.2 Alternative 1: Refurbishment Buildings 3703 and 3234

Implementation of Alternative 1 would involve refurbishment of Buildings 3703 and 3234 to accommodate the increase in the engine testing workload at Tinker AFB. Like the Proposed Action, these are existing buildings where no new construction would be required; therefore, impacts to water resources would be similar to those described in the proposed action.

4.3.2.3 Alternative 2: No-Action Alternative

If the No-Action Alternative were selected, the renovation activities would not be implemented and water resources conditions would remain unchanged from their current status, as described in *Section 3.3*. Selection of the No-Action Alternative would not impact regional or local water resources.

4.4 Biological Resources

4.4.1 Approach to Analysis

Determination of the significance of potential impacts to biological resources is based on 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources are significant if species or habitats of foremost concern are adversely affected over relatively large areas or disturbances cause reductions in population size or distribution of a species of high concern.

USFWS data, ODWC data, and the Tinker AFB *Integrated Natural Resources Management Plan* were reviewed to determine the presence or potential occurrence of sensitive species and habitats in the study area (ODWC, 2007; Tinker AFB, 2007a; USFWS, 2006b, 2006c, and 2007). Potential physical impacts such as habitat loss, noise, and impacts to surface water were evaluated to assess potential impacts to biological resources resulting from implementation of the Proposed Action and identified alternatives.

4.4.2 Impacts

4.4.2.1 Proposed Action

Impacts to biological resources are expected to be negligible. The wildlife habitat surrounding the Proposed Action site is of relatively low quality. Wildlife habitat of higher quality exists to the north, south, and east of the proposed location. Therefore, wildlife that may be displaced by activities related to refurbishment activities could easily find more desirable habitat a short distance away.

Implementation of the Proposed Action would negligibly affect the wildlife species that may transit the site. These species are common and mobile; therefore, these wildlife species could easily avoid direct impacts from the construction activities and forage in nearby unimproved areas. Also, the Proposed Action would occur in an area already disturbed by noise and heavy activity associated with flight and airfield operations. Wildlife inhabiting underground spaces may occur in the area. Such wildlife species are likely accustomed to the existing level of noise and vibration from airfield activity. However, some wildlife may be affected long-term by the increased tempo and vibration from the hush house and may relocate to other field areas more distant from the hush house. Operations at the facility would occur indoors and thus away from potential encounters with wildlife; therefore, no long-term impacts to wildlife would occur under the Proposed Action.

4.4.2.2 Alternative 1: Refurbishment Buildings 3703 and 3234

Implementation of Alternative 1 would involve increasing operations in facilities that are currently used for engine testing; therefore no impacts to biological resources are expected. Buildings 3703 and 3234 are located in an industrial area, and any existing wildlife habitat is of poor quality. Wildlife habitat of higher quality exists to the west of the Alternative 1 site. Wildlife species that may transit the site are common, mobile species that could easily avoid direct impacts from construction activities. Therefore, wildlife that would be displaced by the refurbishment/human activity could easily find more desirable habitat a short distance away. Wildlife in this area is already accustomed to the effects of tempo and vibrations from hush house activity. Operations at Alternative 1 would take place indoors; therefore, minimal indirect impacts to biological resources would be expected.

4.4.2.3 Alternative 2: No-Action Alternative

If the No-Action Alternative were selected, Tinker AFB would not implement the Proposed Action. Therefore, no impacts to existing biological resources, as described in Section 3.4, *Biological Resources*, would result from selection of the No-Action Alternative.

4.5 Transportation and Circulation

4.5.1 Approach to Analysis

Potential impacts to transportation and circulation are assessed with respect to anticipated disruption or improvement of current transportation patterns and systems; deterioration or improvement of existing levels of service; and changes in existing levels of transportation safety. Beneficial or adverse impacts may arise from the physical changes to circulation (e.g., closing, rerouting, or creating roads), construction activity, introduction of construction-related traffic on local roads, or changes in daily or peak-hour traffic volumes created by installation workforce or population changes. Adverse impacts on roadway capacities would be significant if roads with no history of exceeding capacity were forced to operate at or above their full design capacity.

4.5.2 Impacts

4.5.2.1 Proposed Action

Construction-Related Impacts

Implementation of the Proposed Action would require delivery of materials and construction-related equipment and vehicles to the site. However, construction traffic would make up only a small portion of the total existing traffic volume region base, and many of the construction vehicles would be driven to and kept on site for the duration of refurbishment, resulting in very few actual increased trips. Furthermore, increases in traffic volumes associated with refurbishment activity would be short-term; upon completion of construction, no long-term impacts to transportation systems would result.

Operation-Related Impacts

Implementation of the Proposed Action would have negligible operation-related impacts. The proposed hush house would operate with three shifts of three-person crews, staffed with existing Tinker AFB personnel. No new personnel are anticipated with the Proposed Action. The crews would arrive together in a single vehicle that would be left onsite during shifts; therefore, no new parking facilities would be required. Implementation of the Proposed Action would result in fuel trucks, personnel, and engine traffic crossing the taxi-way. However, all traffic will use the proposed route outlined in Figure 4-1, which will result in negligible operation-related impacts.

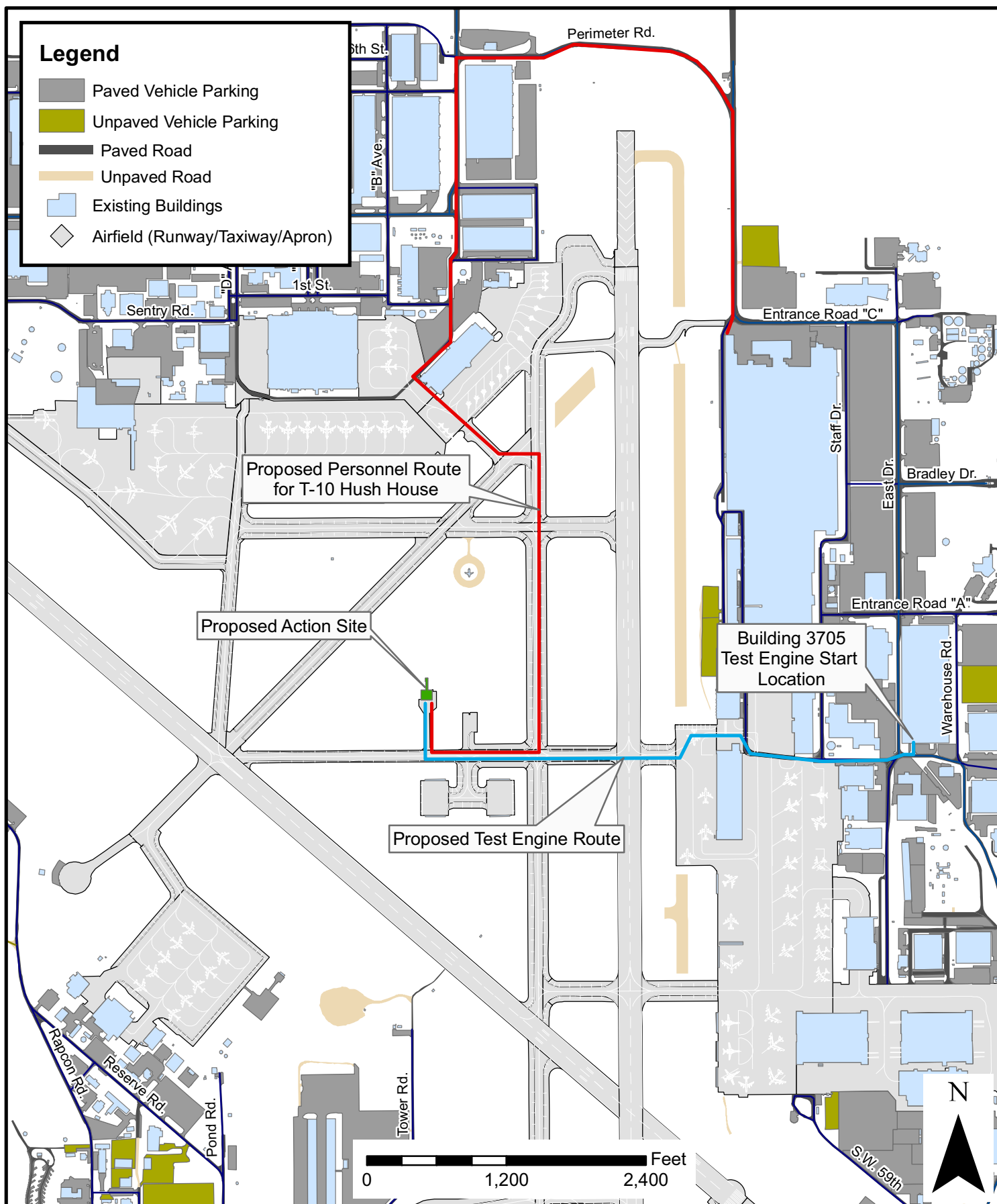
4.5.2.2 Alternative 1: Refurbishment Buildings 3703 and 3234

Construction-Related Impacts

Implementation of Alternative 1 would require delivery of materials and introduction of construction-related equipment and vehicles. However, construction traffic would make up only a small portion of the total existing traffic volume region base, and many of the construction vehicles would be driven to and kept on site for the duration of refurbishment, resulting in very few actual increased trips. Furthermore, increases in traffic volumes associated with refurbishment activity would be short-term; upon completion of construction, no long-term impacts to transportation systems would result.

Operation-Related Impacts

Implementation of Alternative 1 would have negligible operation-related impacts. Testing associated with Alternative 1 would operate with three shifts of three-person crews, staffed with existing Tinker AFB personnel. No new personnel are anticipated with Alternative 1; therefore, no new parking facilities will be required.



EA

**Proposed Action Transportation and Circulation
T-10 Hush House
Tinker Air Force Base**

**FIGURE
4-1**

4.5.2.3 Alternative 2: No-Action Alternative

If the No-Action Alternative were selected, no construction or refurbishment activities would occur. Furthermore, there would be no changes to transportation, parking, or circulation.

4.6 Hazardous Materials and Wastes

4.6.1 Approach to Analysis

Numerous local, state, and federal laws regulate the storage, handling, disposal, and transportation of hazardous materials and wastes; the primary purpose of these laws is to protect public health and the environment. The significance of potential impacts associated with hazardous substances is based on their toxicity, ignitability, and corrosivity. Impacts associated with hazardous materials and wastes would be significant if the storage, use, transportation, or disposal of hazardous substances substantially increases the human health risk or environmental exposure.

4.6.2 Impacts

4.6.2.1 Proposed Action

The purpose of the Proposed Action is to increase the capacity for engine testing at Tinker AFB. The increase in engine testing result an increase in the amount of fuel and lubrication oil used at Tinker AFB, but would result in only a slight increase in the volume of the generation of hazardous waste over time. No new hazardous waste accumulation points would be created. The increased volume would be accommodated within the existing framework of the management, handling, or disposal processes. Manifesting would not be required because hazardous waste would be transported offsite by licensed contractor.

A 2,500-gallon mobile fuel tank trailer would be stored in the containment area outside of Building 926 and connected via a three-inch line to support hush house operations. This tank would need to be properly registered with the OCC. The existing secondary containment for on-site fuel storage will be evaluated to verify that it meets all requirements to accommodate the 2,500-gallon fuel tank. Any required upgrades to the secondary containment would be completed prior to placement of a fuel tank outside the hush house. The existing underground oil/water separator at the facility would be inspected and reactivated in compliance with OAC 165:26 AST regulations by a certified OCC installer. Additionally, the oil/water separator will be added to the Oil/Water Separator maintenance List to ensure periodic pump out.

The construction contractor would be responsible to meet city and state codes, including those associated with the removal of the halon fire suppression system. Per Tinker AFB Instructions, Section 0720, the city and state codes are part of the Request for Proposals for construction contracts. Coordination with airfield security would occur, and construction materials would

likely be kept on-site. Only negligible impacts involving hazardous materials and wastes would occur as a result of the Proposed Action.

4.6.2.1 Alternative 1: Refurbishment of Buildings 3703 and 3234

Impacts resulting from the implementation of Alternative 1 would be similar to those associated with the Proposed Action; an increase in the volume of regulated wastes generated could occur. However, the increased volume would be accommodated within the existing framework of the management, handling, and disposal process. Waste would continue to go to the existing industrial treatment plant, and two fuel tanks are already located on site. Only negligible impacts involving hazardous wastes would occur as a result of this alternative.

4.6.2.2 Alternative 2: No-Action Alternative

If the No-Action Alternative were selected, Tinker AFB would not implement the Proposed Action. Therefore, no impacts with regard to hazardous materials would occur and conditions would remain as described in *Section 3.6*.

4.7 Safety

4.7.1 Approach to Analysis

If implementation of the Proposed Action would substantially increase risks associated with aircraft mishap potential or flight safety relevant to the public or the environment, it would represent a significant impact. For example, if an action involved an increase in aircraft operations such that mishap potential would increase significantly, air safety would be compromised; conversely, beneficial impacts would be those reducing aircraft mishap potential.

Furthermore, if implementation of the Proposed Action would result in incompatible land use with regard to safety criteria such as CZs or APZs, impacts would be significant. Beneficial impacts would include those reducing exposure to mishaps.

4.7.2 Impacts

4.7.2.1 Proposed Action

The Proposed Action involves the refurbishment of an existing hush house facility; activities identified in the Proposed Action have been designed and sited to comply with all airfield safety criteria and are consistent with guidelines established in the base's *Master Plan*. The current halon fire suppression system would be repaired and updated, and fire suppression system would be managed by 579 BSS/GBLC. No facilities development is proposed within airfield CZs or APZs; Further, implementation of the Proposed Action would not result in a change in shape or shift in location of established CZs or APZs. Implementation of the Proposed Action would result in fuel trucks, personnel, and engine traffic crossing the taxi-way. However, all traffic will use the proposed route outlined in Figure 4-1 and all drivers will be flight-line trained.

Therefore, no adverse impacts to airfield safety would result from implementation of the Proposed Action.

4.7.2.2 Alternative 1: Refurbishment Buildings 3703 and 3234

Activities associated with Alternative 1 would be similar to those for the Proposed Action but would occur in a different location, outside of the airfield, and would not involve the removal of a halon fire suppression system. In addition, Buildings 3703 and 3234 will be structurally evaluated and with appropriate upgrades made as needed regarding the increased tempo of engine testing. All proposed construction activities for Alternative 1 are consistent with guidelines established in the base's *Master Plan*. No facilities development is proposed within airfield CZs or APZs; Furthermore, implementation of Alternative 1 would not result in a change in shape or shift in location of established CZs or APZs. Therefore, no adverse impacts to airfield safety would result from implementation of Alternative 1.

4.7.2.3 Alternative 2: No-Action Alternative

If the No-Action Alternative were selected, no changes to safety would occur.

SECTION 5 CUMULATIVE IMPACTS

Cumulative impacts on environmental resources result from incremental impacts of the Proposed Action when combined with other past, present, and reasonably foreseeable future projects in an affected area. Cumulative impacts can result from minor but collectively substantial actions undertaken over a period of time by various agencies (federal, state, or local) or persons. In accordance with the National Environmental Policy Act, the cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the near future are discussed below.

Projects occurring on Tinker AFB and in the vicinity of Tinker AFB are included in Table 5-1.

Table 5-1. Projects occurring at or near Tinker AFB.

DMRT Three Bay Hangar	Construction of a three-bay, multi-aircraft fuel-capable hangar sized for KC-135, E-3, B-1, B-52, and KC-X (Next generation) tanker aircraft. The facility is proposed for construction west of B2280 (which is located on the industrial east side of the base). The new facility is required as part of the Programmed Depot Maintenance (PDM) for KC-135. Workload and repairs for this aircraft take place in three separate facilities that are inadequate in size. The new hangar is required to adequately address these issues and also to consolidate workload and function, improving efficiency.
Construct Air Traffic Control Tower	Construct a new eleven story Air Traffic Control Tower. Construction to include reinforced concrete piers, control tower cab with tinted double glazing, elevator, flight command and administrative area, supervision and simulation training area as well as fire protection, utilities, back-up power, lighting protection, access road, and any other necessary support for a complete and useable facility. Project to include minimum DoD AT/FP requirements and demolition of existing control tower and access road. Due to the close proximity of the Air Traffic Control Tower to the Hush House, this project was taken into consideration during the preparation of this document with regards to noise and vibration and opacity.
Military Family Housing Privatization	Air Force implementation of the privatization initiative which involves leasing of all housing areas to a private developer for 50 years. The Air Force also will convey all 694 existing military units to the developer and depending on the alternative selected the developer would implement a combination of demolition, renovation, and /or construction of housing units to meet the end-state requirement of 660 housing units. Once privatization is implemented, the developer will own, operate, and manager all housing units on the installation while leasing the land underlying the housing communities (approximately 224 acres) for a period of 50 years. Depending on the developer, there will be a combination of demolition, renovation, and new construction distributed throughout the military family housing areas. Included will be alternatives to desired community features such as a sound protection buffer along Sooner, lighted tennis and basketball courts, and an outdoor fitness area.

Table 5-1. Projects occurring at or near Tinker AFB (Cont.)

507th BRAC Action	<p>As recommended by BRAC, the following actions will take place:</p> <ul style="list-style-type: none"> • The relocation of operations and maintenance personnel associated with the 137 Airlift Wing of the Air National Guard from Will Rogers AGS to Tinker AFB, where the 137 AW will become an associative wing, operating with the 507th Air Refueling Wing of the Air Force Reserve Command. Although the 137 AW currently operates eight C-130 cargo aircraft, those aircraft will not follow the 137 AW to Tinker AFB but rather relocated to Pope AFB in Fayetteville, North Carolina • The transfer of four KC-135R aircraft from the 939 Air Reserve Wing from Portland International Airport Air Guard Station to Tinker AFB • The demolition and construction of facilities to support the additional personnel and aircraft. <p>To implement the BRAC action, Tinker AFB has proposed the following:</p> <ul style="list-style-type: none"> • Construction of Air Force Reserve Command and Air National Guard squadron operations, operations support squadron, life support storage, and life support work area • Construction of a new hangar with hangar access and associated demolition of B1037 and B1041, which would also correct a current deficiency at Tinker AFB • Renovation of B1048
DLA Warehouse	<p>Construction of a 167,575 square foot, permanent, non-combustible, General Purpose warehouse with a 25' clear stack height, weather sealed door trucks, loading/unloading docks with dock levelers, paved roadways, and connection. The facility will require steam heat from the Central Heat Plant or boiler. All electrical, mechanical, and fire protection system will meet national, state, and local code requirements. Annex shall house a 123 square meter administrative area with a lunch/break area, restrooms, and locker rooms. A utility annex shall house all the utility functions for this facility. There are 18 depots within the continental United States, most of which are located on active military bases. These Depots support the mission of the Military Installation on which they are located. These Depots also store general commodities. BRAC identified the requirement for construction of additional warehouses at the Defense Distribution Depot Oklahoma City (located at Tinker AFB). This is a BRAC requirement.</p>
Tinker Aerospace Complex (TAC)	<p>Demolish 39 substandard and deteriorated facilities on Tinker Air Force Base and relocate select depot-level aircraft maintenance functions from those facilities to the former General Motors (GM) Assembly Plant adjacent to Tinker AFB. Tinker AFB would lease the former GM property as well as obtain access to a city-owned parcel that would connect Tinker AFB to the new property. Multiple construction projects are proposed to provide access to and secure the perimeter of the Tinker Aerospace Complex.</p>

Table 5-1. Projects occurring at or near Tinker AFB (Cont.)

Construct Medical Clinic	Construction of a new medical clinic, approximately 172,000 sq ft in the open land area northeast of Gott Gate. The new facility will replace the existing clinic and would result in the demolition of the Central Plant, which contains both the chillers and boilers that service the clinic. Demolition of the boiler would also result in de-commissioning an underground diesel storage tank. This proposed project will also include a medical squadron building as well as the War Readiness Materials warehouse. The new clinic will house doctors' offices, exam and treatment rooms, laboratories, radiology, pharmacy, dental clinic, conference and training rooms, as well as storage areas. Energy to operate the new boilers will include a combination of diesel fuel, stored in above ground storage tank and natural gas. The existing medical clinic will also be demolished (approximately 184,000 square feet). Upon completion of the new facilities, the existing medical clinic and TRICARE facility (B5803) will also be demolished.
Child Development Center	Construction of a new Child Development Center in the southwest portion of the Base, north of Southeast 59 th Street and northwest of Gott Gate in the South Forty Area. Size of the facility would be approximately 32,877 square feet. The proposed action would be located approximately 375 feet west of Air Depot Road and approximately 100 feet north of the Base fence line. Approximately 130 feet of the Urban Greenway Multi-Use trail would be removed and re-routed as a result. The new Child Development Center will provide for the care and training of dependent children of both military and civilian personnel assigned to the base. The building will contain areas for child activities, staff support, facility support, core administration, and maintenance. 2.1 acres of land will be required surrounding the facility.
Construct Physical Fitness Center	Construct a physical fitness center to include a health and wellness center to include cardiovascular room, equipment and free weight room, exercise rooms, racquetball rooms, indoor track, Olympic size pool, child play area, 2 full court basketball courts, DV locker rooms, as well as men and women's restrooms. Facility is 8445 SM in size. This project will also include demolition of B5922, B5937, B5927, B5916, B5915, B5924, B5920, B6004, and B216. New facility will be constructed on the west side of the base.
Consolidated Security Forces, South 40 Development	Construction of a 64,000 square foot facility on the south side of the base. This project is to construct a new facility to relocate and consolidate key Security Police Operations functions at a single facility. One centralized facility will reduce the response time to react to various situations.
Construct Consolidated Wing Headquarters Facility	Construction of a consolidated wing headquarters building for distinct legal staff to include a Headquarters Command Section, Resource Manager, Public Affairs, Base Plans, 72 Mission Support Group, 72 Mission Support Squadron, as well as a large Staff Judge Advocate facility. Project involves construction of a multi-story steel frame building on piers and concrete slab. Demolition of B460 and reconfiguration of the road intersection at Arnold and F Streets will also be included in the project. Construction of the new facility is required because the existing building is antiquated and is in violation of the American Disabilities Act. Existing facility also does not meet the Air Force Legal Facilities Design Guide and has insufficient Indoor Air Quality. There are problems with mold, wood rot, and the building has suffered termites in the past.
Demolition of B3108	Building 3108 is scheduled for demolition in plans currently under development. The demolition will take place over the course of a five-year period.

Table 5-1. Projects occurring at or near Tinker AFB (Cont.)

Phase III, 3rd Combat Communications Complex	The purpose of this project is to design and construct a new Squadron Operations Complex for the 32 nd Combat Communications Squadron at Tinker AFB. The new facility will replace thirteen substandard existing facilities. The new consolidated facility will enhance the squadron's capability to train, maintain its equipment and to deploy to any location in the world. The 3rd Combat Communications Group is a tenant on Tinker AFB that provides deployable communications, computer systems, navigational aids and air traffic control services anywhere in the world. The new facility will support a squadron of approximately 141 personnel. The site is located east of Air Depot north of Reserve Road. The Squadron Operations Complex is organized around a core containing the common areas: restrooms, supply room, conference room and training room for all Flights. There are three flight bays located off the core area that provide each flight with conditioned office space, electronic workbenches and drive through bay areas to store, palletize and maintain deployable equipment. The front of the facility contains offices for the Squadron Commander and the Squadron administrative functions.
Construct Consolidated Fuel and Overhaul Facility	Construction of a new consolidated fuels, overhaul, and repair facility on the east side of Douglas Blvd next to B3902. Construction of the facility is required to consolidate functions, improve efficiency, and eliminate the need for major renovation to areas of B3001 and B3108.
Realignment of Air Depot Road/Tinker Gate	Relocation of Air Depot Road/Tinker Gate located on the west side of the base. Relocation is required to provide an adequate and secure base entry. Relocation will alleviate current hazardous traffic congestion and will maintain the base perimeter security. The existing roadway alignment poses a safety issue and does not meet security requirements.

The projects listed in Table 5-1 are planned for construction during roughly the same timeframe as implementation of the Proposed Action would occur. Consequently, the potential exists for cumulative environmental impacts to occur with regard to air quality and traffic. Cumulative air quality are expected to be negligible since all projects would be required to implement BMPs to reduce air emissions below significance thresholds and comply with local noise regulations.

Noise and vibration associated with the Proposed Action were analyzed for potential impacts to the Air Traffic Control Tower. The air traffic control tower is located a sufficient distance from the proposed T-10 hush house such that sound levels from proposed operations would be negligible for those who work within or operations associated with the air traffic control tower. In addition, given the distance and angle of the air traffic control tower in relation to the Proposed Action site, impacts associated from vibration levels would be negligible.

With regard to traffic and circulation, if projects occur concurrently, short-term impacts to traffic caused by additional construction equipment and construction workers traveling along surrounding roadways could potentially cause a short-term adverse cumulative impact during peak traffic hours. However, construction will be short-term and therefore cumulative impacts to transportation and circulation are expected to be less than significant.

SECTION 6 REFERENCES

76 Maintenance Wing (MXW). 2008. Personal Communication via email from Earl D'Alessandro - Revised Future Workload. 25 March.

Air Force Logistics Command (AFLC). 1987. Hush House Site Planning Bulletin, Base Comprehensive Planning. AFLC, Oak Ridge National Laboratory, Boston College. 1 October.

Air Force Handbook (AFH) 32-1084. 1996. *Facility Requirements*. United States Department of the Air Force.

American National Standard Institute 1983. American National Standard Institute Guide to the Evaluation of Human Exposure to Vibration in Buildings. ANSI S3.29-1983ANSI

Battis, James C. 1985. AFGL Hush House Study - Luke AFB Preliminary Results, AFGL Technical Memorandum No. 112, 25 June.

Battis, James C., Crowley, Francis A. 1987, Forecasting Hush House Induced Vibro -Acoustics, AFGL -TR-87-0221, 14 July.

Bies, D.A. and C.H. Hansen. 1988. *Engineering Noise Control*. Unwin Hyman Ltd., London, pp. 89-95.

Bolz, R. E. and G. L. Tuve 1976. Handbook of Tables for Applied Engineering Science, The Chemical Rubber Co., Cleveland, Ohio.

Christenson, S.C., R.B. Morton, and B.A. Mesander. 1992. *Hydrogeologic Maps of the Central Oklahoma Aquifer, Oklahoma*. US Geologic Survey Hydrologic Investigations Atlas, Map HA-724.

DEQ, Air Quality Division. 2006b. Title V Permit. December 2006. Permit No. 99-104-TV (M-2), Tinker AFB Facility-Wide Operating Permit.

DEQ, Air Quality Division. 2007. Memorandum regarding Evaluation of Permit Application No. 99-104-C (M-4) Engine Test Cell Modifications, Buildings 3234 and 3703. 17 April.

Department of the Air Force 2007. Noise Survey Results, Hush House, Bldg 9561. Elmendorf Air Force Base. July 27.

Department of Transportation, Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. Office of Planning and Environment, Federal Transit Administration. May.

Federal Interagency Committee On Noise (FICON). 1992. *Federal Agency Review of Selected Airport Noise Analysis Issues*. Washington, DC.

Federal Transit Authority 2006. Transit Noise and Vibration Impact Assessment. Office and Planning and Environment. May.

Goerke, et al 1990. Vibroacoustic Field Study of T-10 Hush House Emissions. Kirtland Air Force Base, New Mexico. August.

Hoagland, Bruce. 1999. *The Vegetation of Oklahoma: A Classification for Landscape Mapping and Conservation Planning*. Southwestern Naturalist 45(4): 385-420.

Johnson, F.L., M.D. Proctor, T.L. Browning, G.E. Brown, and G.D. Schnell (Johnson et al.). 1995. Native Tallgrass Prairie Assessment/Management Plan, Tinker Air Force Base, Oklahoma. Final report to Woodward-Clyde Federal Services, Del City, Oklahoma. Oklahoma Biological Survey, University of Oklahoma, Norman, Oklahoma. National Center for Educational Statistics (NCES). 2006. Search for Schools, Colleges, and Libraries. Accessed by AMEC via the Internet (<http://nces.ed.gov/globallocator/>), 27 November.

Lee, R. A. 1982. Far-Field Acoustic Data for the Texas ASE, Inc. Hush House, AFAMRL-TR-81-148. April.

Oak Ridge National Laboratory no date. Hush House Site Planning Bulletin.

Oak Ridge National Laboratory 1993. Hush House Site Planning Bulletin: Volumes I Hush House Site Planning Bulletin, Volume II Analysis of Impacts of Hush House Operations, Volume III Hush House Infrasonic and Seismic Emissions Produced by F-100 Engine Tests at Luke AFB, Arizona, and Burlington IAP, Vermont. 30 December.

Oberholser, H.C. 1974. *The Bird Life of Texas*. Vol. 1. E.B. Kincaid, Jr., ed. University of Texas Press, Austin and London.

Oklahoma Department of Environmental Quality (DEQ). 2006a. Regulatory Programs. November 2006. Accessed by AMEC via the Internet (<http://www.deq.state.ok.us/AQDnew/>), 22 November.

Oklahoma Department of Wildlife Conservation (ODWC). 2007. *Oklahoma's Endangered and Threatened Species and Species of Special Concern*. Accessed by AMEC via the Internet (<http://www.wildlifedepartment.com/endanger.htm>), 4 April.

Oklahoma Natural Heritage Inventory (ONHI) Database. May 05, 2003. Federal and State Endangered, Threatened, and Candidate Species in Oklahoma by County, OK. Accessed by AMEC via the Internet, (<http://www.biosurvey.ou.edu/download/heritage/countypr0503.pdf> and <http://www.biosurvey.ou.edu/download/heritage/plants0503.pdf>), 4 April.

University of Oklahoma (OU). 2006. *Oklahoma's Past, Oklahoma County*. Oklahoma Archeological Society, OK. Accessed by AMEC via the Internet (<http://www.ou.edu/cas/archsur/counties/oklahoma.htm>), 9 November.

Oklahoma Water Resources Board (OWRB). 2006. *Groundwater and Surface Water of Oklahoma County, OK*. Accessed by AMEC via the Internet (<http://www.owrb.state.ok.us>), 8 November.

Parkhurst, D.L., S. Christenson, and G.N. Breit. 1993. *Ground-Water-Quality Assessment of the Central Oklahoma Aquifer, Oklahoma: Geochemical and Geohydrologic Investigations*. US Geological Survey Open-File Report 92-642.

Texas Parks and Wildlife (TPW). 2000. *Wildlife Fact Sheets – Texas Horned Lizard*. Internet Site: (<http://www.tpwd.state.tx.us/nature/wild/reptiles/thlizard.htm>) Accessed July 23, 2002.

Tinker AFB. 2001. *Tinker Air Force Base, Integrated Natural Resource Plan, Tinker AFB, Oklahoma*. October 2001.

Tinker AFB. 2002. *United States Air Force Environmental Assessment, Construction of Various Facilities within the South Forty Development Area at Tinker AFB, Oklahoma City, Oklahoma*. January 2002.

Tinker AFB. 2004. *OC-ALC Plan 19-2, Spill Prevention and Emergency Response Plan for Hazardous and Extremely Hazardous Material and Spill Prevention Control and Countermeasures Plan, Tinker Air Force Base, Oklahoma*. October 2004.

Tinker AFB. 2005. *Tinker Air Force Base General Plan*. 2005.

Tinker AFB. 2006a. *Environmental Compliance Assessment and Management Program, FY 2006 Final Report*. 28 August.

Tinker AFB. 2006b. *Air Installation Compatible Use Zone Study*. Tinker AFB, OK. August.

Tinker AFB. 2006c. BASH Data. Personal Communication with Timothy Taylor, 72 ABW/CEVOE. December.

Tinker AFB. 2007a. Draft *Integrated Natural Resources Management Plan (INRMP)*. Environmental Management Division, Tinker AFB, OK.

Tinker AFB. 2007b. Personal communication between John Krupovage, 72 ABW/CEVOE, Tinker AFB and AMEC Earth & Environmental, Inc. June 28.

Tinker AFB. 2007c. *Memorandum from USACE addressed to John Krupovage, 72 ABW/CEVOE, Tinker AFB. Section 404 Review for Tinker AFB, Jurisdictional Determination for Fuel Control Facility (FCF) Site, Identification Number 2007-637*. David A. Manning, USACE Tulsa District Regulatory Office, Tulsa OK. September 21.

Tinker AFB. 2007d. Hazardous Waste Records.

Tinker AFB. 2008a. *Tinker Aerospace Complex Draft Environmental Assessment*. Tinker Air Force Base, Oklahoma. April.

Tinker AFB. 2008b. Personal communication between the following Tinker AFB personnel: Cynthia Garrett, 72 ABW/CEVOE; Earl D'Allessandro, 76 MXW/OBWB; David Stanford, 76 PMXG/QP; Teresa Wheeler, 72 ABW/CEAN; Lou Anna Munkres, 72 ABW/CECR; Bill Dalke, 72 ABW/CEAR and AMEC Earth & Environment, Inc. April.

US Air Force (USAF). 1991. *Natural Resources Management Plan, Tinker Air Force Base, Oklahoma*. Prepared by John R. Krupovage, Natural Resources Manager. July.

USAF. 1992. Air Force Procedure for Predicting Noise Around Airbases: Noise Exposure Model (NOISEMAP) Technical Report, Report AL-TR-1992-0059.

USAF. 1993. Air Force Policy on Ozone Depleting Chemicals. January 7, 1993. <http://www.p2pays.org/ref/10/09630.pdf>

US Army Corps of Engineers (USACE). 1995. *Protected Species Surveys, Tinker Air Force Base Oklahoma*. US Army Corps of Engineers, Tulsa District.

USACE. 2002. *Tinker Air Force Base Special Study, Oklahoma County, Oklahoma*, US Army Corp of Engineers Southwestern Division – Tulsa District, October.

US Department of Agriculture. 2003. *Soil Survey of Oklahoma County, Oklahoma*. Prepared by Natural Resources Conservation Service in cooperation with the Oklahoma Agricultural Experiment Station and the Oklahoma Conservation Commission.

USEPA. 2006. Surf Your Watershed, Environmental Information on Watersheds. Accessed by AMEC via the Internet (<http://cfpub.epa.gov/surf/county.cfm>), 9 November.

USEPA. 2007. National Emission Inventory (NEI) Database for Criteria and Hazardous Air Pollutants. Accessed by AMEC via the Internet (<http://www.epa.gov/air/data/reports.html>), 11 April.

USEPA. 2008. Fire Suppression and Explosion Protection. Accessed by AMEC via the Internet (<http://www.epa.gov/Ozone/snap/fire/>), 23 April.

US Fish and Wildlife Service (USFWS). 2006a. National Wetlands Inventory Maps. Accessed by AMEC via the Internet (<http://wetlandsfws.er.usgs.gov>), 08 November.

USFWS. 2006b. *Determination of Critical Habitat for the Whooping Crane*. Federal Register, Vol. 43, No. 94, 15 May 1978. Accessed by AMEC via the Internet (<http://www.fws.gov/cno/es/listing.html>), 30 October.

USFWS. 2006c. *Final Determination of Critical Habitat for the Arkansas River Basin Population of the Arkansas River Shiner (Notropis girardi)*; Final Rule. Federal Register, Vol. 70, No. 197, 13 October 2005. Accessed by AMEC via the Internet (<http://www.fws.gov/cno/es/listing.html>), 30 October 2006.

USFWS. 2007. Oklahoma County Endangered Species List. Accessed by AMEC via the Internet (<http://www.fws.gov/southwest/es/EndangeredSpecies/lists/>), 4 April.

Wiss, J. F. 1981. "Construction Vibrations: State of the Art," *Journal of the Geotechnical Division, ASCE*, v. 107, no. GT2, Proc. Paper. 16030. February.

Wasmer Consulting. 2007a. BaseOps, Version 7.3. Transmitted to AMEC via the Internet (<http://www.wasmerconsulting.com/baseops.htm>).

Wasmer Consulting. 2007b. NMPlot, Version 4.958. Transmitted to AMEC via the Internet (<http://www.wasmerconsulting.com/nmplot.htm>).

Witten, Alan J., 1987. Hush House Site Planning Bulletin. Base Comprehensive Planning. Vol. II Analysis of Impacts of Hush House Operation , HQFLC/DEP and HQ USAF/LEEVX, 1 October.

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**SECTION 7
LIST OF PREPARERS**

This report was prepared for, and under the direction of, the Air Force Center for Engineering and the Environment, by AMEC Earth and Environmental, Inc. Members of the professional staff are listed below:

Project Management

Aaron Goldschmidt, Program Manager

M.A. Geography

Marcie Martin, Project Manager

M.S. Environmental Management and Industrial Hygiene

Technical Analysts

Shannon Traub

B.S. Environmental Science

Leanna Struzziery

M.E.S.M. Environmental Science Management

Steve Ochs

M.S. Chemical Engineering

Brian Cook

B.A. Biology

Scott Hershberger

B.S. Environmental and Natural Resource Economics

Theresa Price

M.S. Applied Biological Sciences- Botany & GIS

Heather Rothbard

B.S. Botany

Mike Rucker

M.S. Geotechnical Engineering

Production

Enrique Tapia

GIS Analyst

Paul Barbera

GIS Analyst

Angie Salaiz

Graphics

Ellen Carroll

Word Processor

Gerrie Gomez

Word Processor

2086

APPENDIX A

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Agency Notification of Environmental Assessment



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

JUN 18 2008

MEMORANDUM FOR OKLAHOMA CORPORATION COMMISSION
ATTENTION: MR. JEFF CLOUD, CHAIRMAN

FROM: 72 ABW/CEAN
7701 Arnold Street, Suite 204
Tinker AFB OK 73145

SUBJECT: Notification of Environmental Assessment, Refurbishment of Building 926,
Tinker Air Force Base

1. Tinker Air Force Base (TAFB) has prepared an Environmental Assessment (EA) in accordance with the National Environmental Policy Act. The EA analyzes potential environmental and socioeconomic impacts associated with the re-activation of Building 926 for engine testing. Building 926 is a hangar-like structure designed to isolate aircraft engine noise during diagnostic engine testing. Building 926 is located between the two operational runways on TAFB. No significant impacts were identified through the EA.
2. An electronic copy of this document has been included for your review. The formal comment period is from 18 Jun to 9 Jul 2008. The comment period is a continuation of the public involvement process used to develop the draft assessment. The public is invited to review the draft report and make comments.
3. We request your participation in the process and solicit any comments or concerns you may have on the Draft EA. Please send your environmental comments by Close of Business (COB) 9 Jul to:

72 ABW/CEAN
Attn: Ms. Cindy Garrett
7701 Arnold Street, Suite 204
Tinker Air Force Base, Oklahoma
4. In an effort to conserve resources and reduce paper use, an electronic copy has been provided. If a paper copy is preferred, please let us know. Point of contact for this matter is Ms. Cindy Garrett. Ms. Garrett can be reached by telephone at (405) 734-2097 or by e-mail at cynthia.garrett@tinker.af.mil. Thank you for your assistance in this matter.

Trudi Logan, Acting Chief
Asset Management, Natural Infrastructure
Civil Engineering Directorate



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

JUN 18 2008

MEMORANDUM FOR OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
CUSTOMER SERVICES DIVISION
ATTENTION: MS. MARGARET GRAHAM

FROM: 72 ABW/CEAN
7701 Arnold Street, Suite 204
Tinker AFB OK 73145

SUBJECT: Notification of Environmental Assessment, Refurbishment of Building 926,
Tinker Air Force Base

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Trudi Logan, Acting Chief
Asset Management, Natural Infrastructure
Civil Engineering Directorate

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APPENDIX B

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Public Notices

in the hit 1983 TV miniseries "V" spurred comic books, video games and other ancillary spinoffs. Creator Kenneth Johnson returned to the world of "V" this year with his sequel novel "V: The Second Generation."

"The Second Generation" is being developed as a possible TV movie or miniseries.

The original miniseries, a story of America under occupation seen by 80 million people, was inspired by Sinclair Lewis' book, "It Can't Happen Here."

"With 'V,' it was very interesting, because my initial concept for 'V' had nothing to do whatsoever with aliens," Johnson said. "I had been going through the works of Sinclair Lewis, who wrote 'Elmer Gantry' and 'Main Street' and a bunch of great novels. A lesser known novel of his is called 'It Can't Happen Here.'"

"It Can't Happen Here" details an America overrun by fascism.

"What an interesting idea, to turn America into a state that was run by a tyranny and operated by fascists," Johnson said, who was inspired to write a screenplay about a grassroots fascistic movement taking hold in the United States.

Brandon Tartikoff, then the head of NBC, read it, and wasn't sure Americans would get fascism. He proposed that America would instead be under occupation by the Russians, or Chinese. Johnson said he wasn't sure it was be-

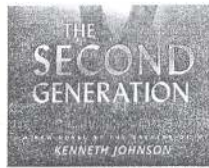


PHOTO PROVIDED BY TOR BOOKS

"V" creator Kenneth Johnson returns to an America under occupation by alien visitors in his novel "V: The Second Generation."

lievable that the Chinese or Russians could sustain an occupation. Then, Johnson said, someone suggested aliens.

"Here I go again," Johnson said. As the creator of "The Bionic Woman" and the developer of "The Incredible Hulk" for television, he was wary of being pigeonholed in science fiction. However, after considering the idea further, he changed his mind.

"The more I thought about it, the more I realized it was a great opportunity, because not only could I tell the story that I wanted to tell, about how ordinary people are changed or corrupted or become heroic because of extraordinary circumstances, but I could do it in a way where I had all this wonderful visual eye candy that would attract everyone's attention," he said.

This allowed Johnson to tell his story, which was "not about aliens or reptilian races or spacecraft, but a story in which

"Virtually all of the principal characters in the Second Generation have at one point or another a crisis of conscience about loyalty," Johnson said. "And loyalty is a theme that runs throughout the entire novel."

Matthew Price: 475-3290, mprice@oklahoman.com. Read Matt's blog about comic books, video games and more at <http://blog.newsok.com/nerdage>

The show is really fantastic. The writing is sharp, the actors are well-cast (especially Sharon Gless as Westen's overbearing mother), and the stories are exciting and interesting. Michael is determined and focused, and Donovan does an amazing job of balancing the fierce determination with a biting sense of humor.

Forced to play in a game well beneath his skill set, Westen is almost gleeful messing with clearly outmatched Miami thugs and bad guys. He faces a more mysterious and dangerous adversary, however, as he sets out to find who gave him his burn notice.

action sequence might just as well be a commercial, and I was amazed to find myself getting bored watching one extended "best of" sequence involving all the various good-looking women wearing bikinis and skimpy outfits in the first season (I swear this is so, and it's totally unrelated to watching the DVD with my wife).

Is there any television left where the writing is great and the cast is brilliant? You bet, and "Burn Notice" is too good for just one viewing.

Steve Lackmeyer: 475-3230, slackmeyer@oklahoman.com

Public Notice

Tinker Air Force Base Invites Public Comment Environmental Assessment

Hush House (Building 926) Refurbishment

The United States Air Force and the 72nd Air Base Wing have prepared an Environmental Assessment (EA) which is available for public review and comment.

Pursuant to the Council on Environmental Quality (CEQ) regulations and in accordance with the National Environmental Policy Act, an environmental assessment has been performed to evaluate the refurbishment of Building 926 for engine testing. Building 926 is located between the two runways on Tinker Air Force Base. The proposed action will include renovation of Building 926 and its associated systems, including fire suppression, electrical, communication and potable water.

No significant environmental impacts have been identified through the EA.

The public is invited to review the draft assessment and make comments. Written comments and questions can be submitted before close of business on 9 July 2008.

The final draft for the Environment Assessment is available to the public at the Tinker Information Repository located in the Midwest City Public Library on Reno Avenue. Hours of operation are 9:00 a.m. to 9:00 p.m. Monday thru Thursday; 9:00 a.m. to 5:00 p.m., Friday and Saturday; and 1:00 to 5:00 p.m. on Sunday.

The public may submit written comments to the address below:

72d Air Base Wing Public Affairs Office
Brion Ockenfels
7460 Arnold Ave., Suite 127
Tinker Air Force Base, Oklahoma 73145
Phone: 405-739-2027/26
E-mail: brion.ockenfels@tinker.af.mil

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COUNTY OF OKLAHOMA } SS.

Affidavit of Publication

Sina Calame, of lawful age, being first
duly sworn, upon oath deposes and says that he is the rep
of The Oklahoma Publishing Company, a corporation, which is the publisher of the

The Oklahoman, which is a daily newspaper
of general circulation in the State of Oklahoma, and which is a daily newspaper
published in Oklahoma County and having paid general circulation therein; that
said newspaper has been continuously and uninterruptedly published in said coun-
ty and state for a period of more than one hundred and four consecutive weeks next
prior to the first publication of the notice attached hereto, and that said notice was
published in the following issues of said newspaper, namely:

Mon. 4/30 - Wed. 5

Subscribed and sworn to before me this 20th

day of June, 2008

Riamah Featherston Sina Calame
Notary Public

My commission expires April 1, 2009



Public Notice

Tinker Air Force Base Invites Public Comment Environmental Assessment Hush House (Building 926) Refurbishment

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The public may submit written comments to the address below:

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Brion Ockenfels

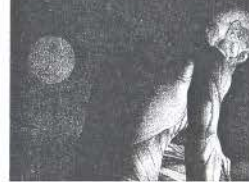
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